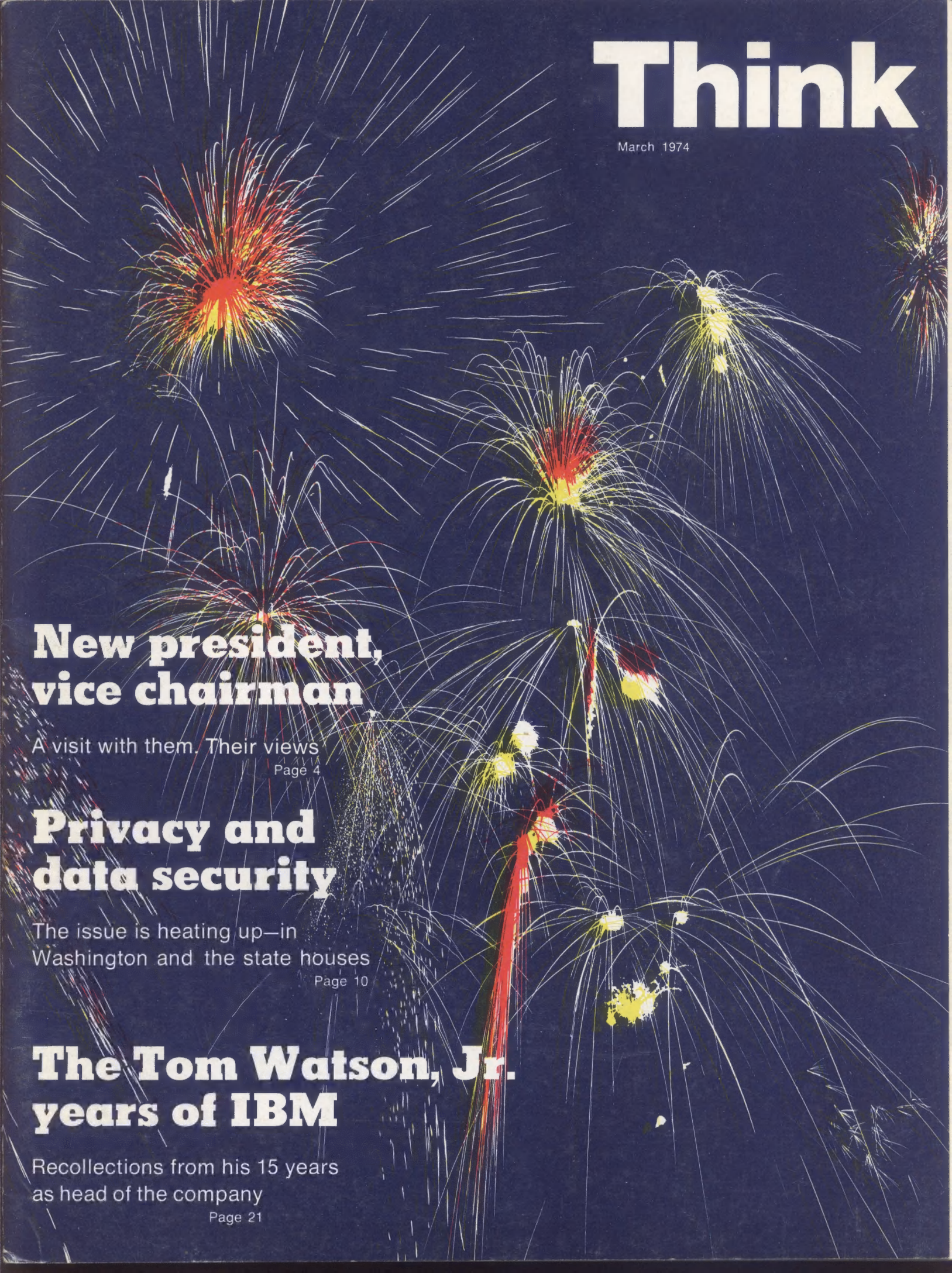
# Think

March 1974



## New president, vice chairman

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## Letter from the Chairman

Fellow IBMers:

In recent years, there has been a widespread and growing public concern about the need to protect the individual's right to privacy. It is my belief that few issues will prove to be of greater significance to IBM.

Our familiarity with the problem and our sense of responsibility for contributing to solutions have evolved gradually, and our executives have testified on several occasions before Congressional committees, most recently this past January. You may read excerpts from this testimony in this issue.

In terms of specific action, we have financed and participated in studies of privacy by leading academic and legal authorities. In 1972 we committed $40-million over five years to study—and to implement—various aspects of data security. This work includes a number of joint studies with customers, results of which will be published on completion, as promised, for the benefit of all industry.

I am determined that we in IBM practice internally what we propose externally for our customers and the society generally. Accordingly, last year I asked for an intensive examination of our personnel practices to make sure that we are doing everything possible to protect the privacy of our own employees. That is a complex effort but it has been a fruitful one. While not complete, it has taken us a long way toward my personal goal of establishing IBM as the leader in employee privacy.

I will be reporting to you on our progress in the months ahead.

Frank Cary

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# Think The contents of this issue, in brief

## THE COMPANY


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IBM has a new president and a new vice chairman of the board.

Late last month, Frank T. Cary, chairman of the board, announced that John R. Opel and Gilbert E. Jones, respectively, had been elected to these positions.

In separate interviews with *Think,* Opel and Jones, who continues as chairman of the board of the IBM World Trade Corporation, talk about their experiences in the company and give their opinions of what lies ahead for IBM.

Also announced: the replacement of the Management Review and Management Committees by a single group, the Corporate Management Committee. Members of the CMC are Cary, Jones, and Robert W. Hubner and Warren C. Hume, both IBM senior vice presidents.

Elected an IBM senior vice president and group executive, Data Processing Product Group, succeeding Opel was Paul J. Rizzo, formerly vice president, finance and planning.

**Coping with shortages** 44

The oil shortage has had a domino effect. Without oil, an essential "feedstock" raw material, many chemicals and plastics can't be produced. Without these, many industries can't manufacture products. Thus, the current crisis has sent everyone scrambling—for plastics, chemicals, and steel—the materials of which their products are made.

How has IBM met this crisis of scarcity? Corporate purchasing has coordinated a worldwide effort to ensure plants and labs enough fuel to keep going, enough materials to turn out products. The name of the game: conserve available supplies, substitute for scarce materials where feasible, plan ahead.

**On target** 46

Everybody's on board. In plants, labs, branches, and headquarters, IBM people are making an extra effort to save fuel and electricity. A report on 33 IBM locations shows the company exceeding its objectives, with more than a 20 percent savings in fuel and 10 percent in electricity.


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The explosion of information technologies has heated up the long-time conflict between society's stake in freedom of information and the individual's desire for privacy. Society already relies heavily on the computer—and the vast amounts of information it can store—to provide essential services. But there is also a widespread feeling that individuals are losing control of the use of personal data about them. A new balance, it is widely agreed, must be struck.

Over the years, the law has said surprisingly little on the subject of privacy and record-keeping. Into this vacuum are pouring proposals from legislators at every level of government, threatening a crazy-quilt pattern of laws. One solution: Guidelines for information practices should be tested by those seeking to resolve ambiguities of interpretation in practical cases.


## MANAGEMENT VIEWPOINT


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Dr. Lewis M. Branscomb, IBM vice president and chief scientist, goes to Washington to present the company's view on privacy and data security before a Congressional subcommittee. He calls for guidelines on privacy but not on data security techniques. Once privacy principles are established, he says, improved techniques for safeguarding privacy will evolve.

Among his other points: Any consideration of privacy must embrace manual as well as electronic files; the proper balance has to be found between limiting access to information for the protection of privacy and allowing freedom of information to protect the public interest; and information practices should also take into account the wide variety of information files which exist, ranging in nature from the trivial to the complex and sensitive.

**A look at the business** 39

Endicott alumnus Frank Cary (sales trainee, Class of '49) returns to that upstate New York town to visit the company's plant and lab. The facility, the first in IBM, is starting its 60th year. A week later, he visits Kingston to help mark the 20th anniversary of groundbreaking for the Mid-Hudson Valley facility.

At both stops, he congratulates IBMers for their achievements in 1973. His reaction: "It's always a great pleasure for me to get out of the ivory tower and see for myself what's going on."

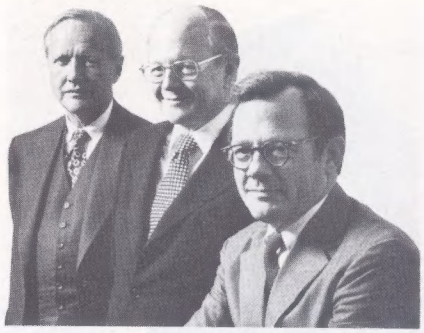

## THE WORLD


**Real World** 18

"Our aim is to push forward . . . to generate new ideas, and to bring scientific advances into IBM from wherever they occur."

The speaker: Dr. Ralph E. Gomory, IBM vice president and director of research. He's talking about several programs under which post-doctoral and established university scientists work at IBM facilities for up to two years.

The scientists like the experience, and IBM benefits from new ideas in research and, "an enormous amount of intellectual stimulation."



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## SPECIAL FEATURE

**The Tom Watson, Jr. years of IBM** 21

From the mid-Fifties on, IBM—already noted for its management style and its marketing skills—scored spectacular advances as it moved into computers, increasing greatly in size, scope, and reputation. There were a number of reasons why. Among them, the vigorous leadership of Thomas J. Watson, Jr., who became the company's chief executive officer in 1956.

Watson, who had stepped down as chairman of the board in 1971, retired as an active employee at the end of January past, the month in which he reached his 60th birthday. He continues as chairman of the executive committee of the board.

What were some of the key decisions Watson was involved in as the company moved into the computer age? What are his thoughts as he looks back on a 37-year career? What does he see for IBM in the years ahead?

A special *Think* section highlights an exciting period in the life of the company and the contributions of one of its outstanding leaders.

## EDUCATION

**Now, it's 'relevant' math** 40

Over 20 years ago, children learned math by rote: 4 + 4 = 8—and don't use your fingers. In the mid-'50s, there was much criticism that students had little insight into how numbers really worked. Then the "new math" emerged, with emphasis on theory rather than drill.

Today, many educators say, we need a better balance between theory and practice. That's the goal of Science Research Associates, Inc.'s new Mathematics Learning System. Thoroughly field-tested, this product is in the marketplace.

## NOTES

Most IBMers in the company today have shared, in some measure, the zest, the excitement and, most particularly, the accomplishments of that period which *Think* in this issue calls "The Tom Watson, Jr. years of IBM."

Some have gone the whole way. For example, more than 30,000 employees in the U.S. company alone have been with IBM since Watson became chief executive officer in 1956. Some 4,200 go back to 1946, the year when he, like so many others, rejoined the company after World War II. A dwindling band of 438 goes all the way back to 1937, the year Watson came to IBM as a beginner salesman straight out of college.

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Eight years ago when a Congressional subcommittee held hearings on a proposed National Data Center, critics foresaw the handwriting of *1984* on the wall. Author Vance Packard, for example, saw it as the start of electronic-dossier keeping and he denounced the proposal for the computer-equipped center as a "threat to individual liberty."

Almost overnight, newspapers picked up the cudgels and the proposal was soon scotched. But the episode raised, almost for the first time, the issue of one's claim to privacy in a computer/electronic age.

Today, lawmakers of all stripes are no longer talking about the need for privacy legislation—but what kinds of laws should be passed.

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Long used to acronyms and abbreviations, IBMers will soon be adding another set to their vocabulary—CMC. It stands for Corporate Management Committee, now the company's top policy-making committee. Its members: Chairman Frank T. Cary, Vice Chairman Gilbert E. Jones, and two other seasoned executives, Senior Vice Presidents Robert W. Hubner and Warren C. Hume.

Hubner joined IBM as a salesman in Seattle, his hometown, 33 years ago. But while he spent most of those years in data processing, his experience spans the other side of the business as well. In 1968, he took over as group executive for the Office Products, Federal Systems, Advanced Systems Development, and Information Records Divisions; Science Research Associates, Inc., an IBM subsidiary; and The Service Bureau Corporation, then an IBM subsidiary. He held that post until 1972 and during that period, the group set the pace for growth in IBM. Two years ago, he was named senior vice president and a member of the Management Committee.

Hume is a 35-year IBMer who joined the company as a salesman in Chicago. After a wartime stint in the Navy Air Corps, he rejoined the company, became first head of DPD's Midwestern Region, then president of the division in 1961; he was there at the introduction of System/360. Hume was elected an IBM vice president in 1964. He's been a senior vice president for six and a half years and a member of the Management Committee for five.

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*Scores of employees have called to request extra copies of the 20-page section on energy conservation appearing in the December 1973 issue of* Think. *The section has been published in a special reprint and is available at Mechanicsburg, Pa.*

*The new Corporate Office:*
*Gilbert E. Jones, vice chairman;*
*Frank T. Cary, chairman of the board;*
*John R. Opel, president.*

# New president

## It's John R. Opel. At 49, he's made his mark in almost every part of the business—from marketing to finance to product development and manufacture.

by Angelo M. Donofrio

With the election of John R. Opel as IBM president, the Corporate Office—which manages the day-to-day operation of the business—again becomes a triumvirate. Opel fills the seat vacated when Thomas J. Watson, Jr., retired in January. The new president joins Chairman Frank T. Cary, IBM's chief executive officer, and Gilbert E. Jones, the new vice chairman, who is also chairman of the board of the IBM World Trade Corporation.

Paul J. Rizzo replaces Opel as senior vice president and group executive, Data Processing Product Group. Dean P. Phypers succeeds Rizzo as IBM vice president, finance and planning. And P. Martin Foley, formerly controller, was named an IBM vice president and succeeds Phypers as vice president, business plans.

John R. Opel, 49, professorial in appearance and casual in manner, is only the seventh president in the 60-year history of IBM. And he likes being number seven.

At an executive meeting after he was elected, Opel told a little story: Technically, he said, IBM began in 1911 because that's when the Computing-Tabulating-Recording Company, forerunner of IBM, was incorporated. But 1914 has become the official year because that's when Thomas J. Watson, Sr., joined C-T-R as general manager.

"If you go back to 1911," said Opel, "I'm the tenth president. If you choose 1914, I'm the seventh. I prefer being number seven for two reasons. I didn't know Percy Brundage, George Fairchild, or Frank Kondolf, the men who served as presidents from 1911 through 1914. But I worked as an employee under all six of the others.*

"Secondly, Andrew Jackson was the seventh president of the United States and John Tyler was the tenth. I still like number seven."

Opel smiled, and his audience had a good laugh. The incident was typical of the company's new president, who brings wit and intellect to the office. As IBM Chairman Frank T. Cary puts it: "John's experience, his sheer intellectual capacity, his sensitivity to people, and his sense of humor will make him a great president."

How does it feel to become president of IBM?

"You're filled with two kinds of emotion," says Opel. "You're extremely proud but awfully mindful of the extreme responsibility and long heritage that goes with it. Most people are motivated by challenge, and the challenge here is to try to match the performance of those who preceded me. It's a tremendous mark to measure up to.

"We know we have a great industrial enterprise," he adds, "and fundamental to all of that is the quality of our people. Foremost in my mind on the day of Frank Cary's announcement [February 26] was the quality of the management team."

Few people who meet John Opel—a trim, five-foot-ten-inch man who likes to carry his briefcase in one hand and a light topcoat bunched in the other—think of him as a 25-year veteran of IBM. But, this July, he enters the Quarter Century Club. And, despite a youngish appearance, his working career spans the computer era.

In 1949, Opel—fresh out of graduate school and Army service in the Pacific—was thinking seriously about studying for a Ph.D. in econometrics. He had earned a bachelor's degree in English and economics at Westminster College, Fulton, Mo., and a master's in business administration from the University of Chicago. But Harry

* Thomas J. Watson, Sr., 1915-1949; John G. Phillips, 1949-1952; Thomas J. Watson, Jr., 1952-1961; Albert L. Williams, 1961-1966; T. Vincent Learson, 1966-1971; Frank T. Cary, 1971-1974.

'We can't hide from our critics. But our strongest ally is the customer . . . There can be no legal reversal of imaginative innovation and honest effort. And that's what IBM and its people have always represented and always will.'

—John Opel, Family Dinner
Los Angeles, Nov. 14, 1973

Strait, a family friend and manager of the Jefferson City, Mo., branch office, sparked his interest in a business career with IBM. After a 15-day fishing trip to rethink his plans, the young student was hooked on Strait's offer of a sales job.

"It looked like an interesting little company," Opel recalls, "and punched card machines fascinated me."

The fascination has lingered on, to say the least. For Opel, who is very much at home talking about the promise of new technology, conveys an excitement about the future of data processing. He jots down a few figures on his desk pad to demonstrate the dramatic increases in computer power and decreases in cost.

"Sure, we're facing serious national and international problems right now," says Opel. "I take a middle view on the economy for the second half of 1974. We see signs of economic recovery and, at the same time, we face the uncertainties associated with the energy crisis. But long-range, I'm just as confident as I can be.

"First of all, I have great confidence in this country. With the strides that have been made in the economic unification of Europe and the new opportunities for trade in Eastern Europe, the Soviet Union, and the People's Republic of China, how can anyone be pessimistic?

"Then, look at where we are in IBM," Opel continues. "We're a young business with a dynamic and exciting technology. We have the will and the skill to make use of that technology to the fullest. There's a vast market, and there's a match between that market and our technology. Our business is as exciting as ever."

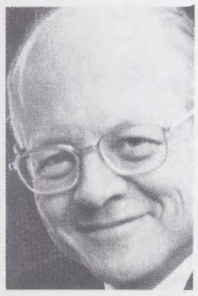
And a lot more complex, Opel hastens to add. To make the point, he is fond of recounting his experience as a young salesman: "My territory ran through central Missouri from Iowa to Arkansas. In retrospect, that territory had about the same opportunities for market development as the Arctic Circle. In those days, we looked to change for deliverance. Lying flat on your back, wiring IBM 285 tabulators, it was easy to believe any change would be for the better.

"The 285 was a curious product because when you sold one you also had to sell a motor-generator set to power it. It was like selling a car and then asking the customer if he would also like to have an engine. The installation of the 285 and its generator was quite an event in those little country towns. When you turned it on, you wondered whether the lights in the community were going to dim."

Opel sold time clocks as well. "I had a clock system in Centralia, Missouri, connected to a fire alarm," he recalls. "I made a maintenance call and adjusted the program drum for daylight saving time. The next day was Sunday, and the whole town was in church. The whole town also belonged to the volunteer fire department. The fire alarm went off as a result of some adjustment I hadn't made in the program . . . We had programming difficulties in those days, too."

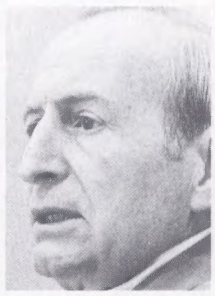
Since the days of time clocks and tabulating machines, IBM has participated in several technological revolutions and evolutions. Opel has held key posts along the way.

After 10 years in the field—in Washington, D.C., Atlanta, and Endicott, he served for two years (1959-61) as administrative assistant to Thomas J. Watson, Jr., then IBM president. For one year, he was IBM director of communications. He worked as assistant to T. Vincent Learson (then vice president and group executive), and subse-

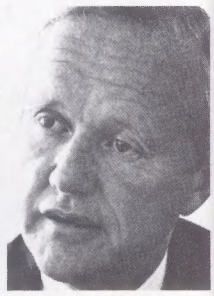


*Frank Cary*

*Robert Hubner*



*Warren Hume*



*Gilbert Jones*

## Corporate Management Committee

The newly formed Corporate Management Committee (CMC) brings a total of nearly 130 years of IBM experience to bear on developing long-term policy for the corporation. Its members are Chairman Frank T. Cary, Vice Chairman Gilbert E. Jones, Senior Vice President Robert W. Hubner, and Senior Vice President Warren C. Hume.

While the function of the Corporate Office (Cary, Opel, and Jones) is to manage the day-to-day operation of the business, the function of the CMC is long-term policy development.

The CMC replaces both the Management Review Committee, formed in 1965, and the Management Committee, formed in 1967 to assist the Corporate Office. The basic purposes of the CMC include establishing company-wide objectives, corporate policies, and the management structure and processes required to achieve those objectives; approving corporate and operating unit plans, and company-wide personnel programs.

quently as group director, product line, at Corporate Headquarters.

Opel became director of product programs for the Data Processing Division in March 1964, and four months later DPD vice president, marketing. In November 1965, he was promoted to assistant group executive—plans and controls, DP Group staff. He was elected an IBM vice president in May 1966; served on the Management Committee starting in October 1967; and was promoted to vice president in charge of finance and planning in March 1968. He was elected a senior vice president in 1969 and chairman of the Management Committee a year later.

In January 1972, he became group executive for the DP Product Group, consisting of the General Products, General Systems, System Development, and System Products Divisions. He has been a member of the board of directors since September 1972.

His election to the presidency came as no surprise to Opel's family. He had told his wife, Carole, and their five children about the upcoming election on the previous weekend. They went out and bought some champagne.

Back in Jefferson City, Opel's father, 78, a retired hardware store owner, gave an interview to the *Capitol Daily News*. In the story, headlined "Former Resident Heads Corporation," Opel's parents credited their son's success to "his drive for working *with* and *for* people."

What are John Opel's greatest concerns as he takes office?

"There are, of course, the uncertainties in the country and the world. But my greatest concern, in IBM, is that we measure up to the opportunities. We are on the threshold of great achievements. My concern is how we go about accomplishing them.

"I'm extremely optimistic. And why not? When you have the great resources—primarily the people of IBM—you can't fail. The question is do we have the drive, the dedication, the ingenuity? I think we have." ■

# Technology

## Where's it going? Some answers from John Opel.

**How do you view the future of data processing?**

We are in the middle of a revolution that is not totally apparent and certainly not complete. It has to do, on the one hand, with a whole series of exciting developments for small users and, on the other hand, with data base/data communications systems. Both are equally explosive, and to those two you can add a third element, terminal communications subsystems. All three areas of technological growth will bring about a whole new array of applications that we have yet to install. Bringing them to fruition will be an exciting experience.

**Some people say the next major computer revolution will be in programming, making computers easier to use. Where would you say we are now, and where do we want to be?**

We've made significant strides with virtual storage, especially in increasing the productivity of programmers. That's a major step. On a scale of one to ten, vs moved us a couple of points. There's still a long way to go in designing easy-to-use systems without sacrificing their flexibility or their cost/performance.

**Over the last year or so, there have been major realignments in the DP Product Group. A major reason has been the blurring line between manufacturing and development, and the consequent need for greater integration. How well has integration worked?**

We've come quite a way. The System Products Division's advanced product units have helped break down the barriers between developing new products and turning them out in a practical way.

We have further found that the linkage of Manassas with development activities in both Kingston and Raleigh has helped us turn out a structured set of second-level products.

A year is not a long time. But the evidence is there, and the people in the critical areas involved will tell you that integration has made a significant amount of difference—in the mutual exchange of information and the resolution of issues that require joint tradeoffs between development and manufacturing.

**How do you respond to critics of technology who view it as a threat?**

If technology and science have increased the dangers of our future, they have also given the individual more choices than ever before. Note the word *choice*. The decision remains a human one, and man now has the whole world of communications and other technologies to help him make those choices.

**How do computers fit in?**

The world can't be fixed by computers alone. But the power they contain, the potential they harbor, can and must be applied in ways that raise the human spirit as well as material standards.

**What about IBM's role?**

Being in one of the world's most dynamic industries is gratifying, but it makes unprecedented demands. And it doesn't take no for an answer. The satisfactions of being the leader in that industry have to be positioned against the imperative that we must go on leading.

# Vice chairman

## For Gilbert E. Jones, a new title. It underscores his important role in the Corporate Office.

When the announcement of IBM's new management team appeared in *The Wall Street Journal,* it referred to Gilbert E. Jones—newly elected vice chairman of the board—as IBM's "most experienced senior executive."

Chairman Frank Cary says: "Gil is one of the most decisive and effective men in the IBM Corporation. Everywhere I go in the world, I find great respect for his leadership."

IBMers who have known Gil Jones during his 36 years in the company are familiar with the marks he has made. He headed the Data Processing Division during its transition into second-generation computers. He went to the World Trade Corporation when it accounted for only 23 percent of the company's gross and last year saw it go to 47 percent. He has been a member of the Management Committee. For a year now, he has been one of the triumvirate in the Corporate Office. And he is still chairman of the board of WTC.

In his typical self-effacing way, however, Jones scoffs at *The Journal*'s description. "I take that with a grain of salt," he says. "I think they're referring to my old age." He is 57. Cary is 53; Opel, 49.

More serious for a moment, Jones says: "I look at the IBM company as the greatest business institution in the world. To serve in the Corporate Office and now as vice chairman is a goal I never even dreamed of. I am delighted."

What about the selection of John Opel as president?

"A great choice. I couldn't be more pleased and I'm sure most IBMers are. Of all the people who have the managerial and intellectual ability to steer IBM with a real understanding of the technology, I think he is the best. And I'm sure we're going to benefit enormously as he puts that expertise to the challenge of the rapidly changing technology we're in."

Jones, a tall, outspoken man, is known as a no-nonsense executive. And, indeed, when you weigh his career in terms of those with whom he has worked, he probably is the most experienced executive in the company.

"I guess maybe I have been the luckiest man in IBM," is the way he puts it. "I've had some great jobs and I held them at the times they were *the* most exciting in the business.

"First, I was with Tom Watson, Jr., when he became chief executive officer. Those two and a half years were the most exciting of my life. Second, I was at World Trade with Dick Watson for seven years. And those were the years when he took World Trade from punched cards into computers.

"And, lastly, I've had the unusual opportunity of working with Tom Watson, Vin Learson, and Frank Cary during these last three years. So, in that sense, all of those jobs I held came at the right time. Call it luck. That's what it is."

A graduate of Harvard, Jones joined IBM in 1938 as a sales representative in New York City. He went into the Navy in World War II, serving as an antisubmarine officer for a destroyer group in the Atlantic. "That's where I first learned how to handle responsibility," he says.

Returning to IBM after the war, he filled a variety of sales positions and in 1959, at the age of 42, became president of the Data Processing Division. In 1961, he went over to World Trade as a vice president of that organization. A year later, he was named executive vice president and a member of its board of directors.

In 1963, he took over as president of WTC. That same year he was elected an IBM vice president. And as Arthur K. Watson's day-to-day operating man, he stepped up his global travels; to date, the business has taken him to 69 countries, many of them two, three, or four times a year. In 1967, he became an IBM senior vice president and, in 1970, Jones was elected WTC board chairman when Dick Watson left to become Ambassador to France. Jones remembers the year for another reason. It was the first year in which WTC earnings passed those of the U.S. company.

What further contributions does he expect to make?

"Well," he says thoughtfully, "I look back on the relationship Dick Watson had with the chairman when he was in this job. I would hope that I can support Frank Cary the same way Dick helped Tom. And I'm referring not only to the World Trade side of the business, but I also want to help lighten some of the pressures of all kinds that are always on the chairman.

"When I look at what management has to do to force decision-making downward and get decisions made in a timely way, I would hope that my major contribution to Frank Cary will be to help bring up a young management team and assist them in keeping this business as oriented to the individual as it has been in the past. And, it goes without saying that I want to help Frank in every way I can in conducting the worldwide business of the company."

# The worldwide marketplace

## A Q&A with Gil Jones.

**Q. How has the oil crisis affected IBM's business overseas?**

**A.** There are two parts to this oil crisis. First, if you track the growth of G.N.P. (gross national product) with the use of energy, you'll find those two lines have always paralleled one another historically. So first you have to ask—Will we have the energy in the future to permit continuing economic growth? In my opinion, the answer is yes. I believe we'll find ways of making the same amount of energy go much farther. I'm not especially worried about that. The other part of the piece has to do with the balance of payments. With the increased price of a barrel of crude oil, the strain on both the United States and other countries to solve their balance of payments problems is severe. It is much more severe in Europe and Japan than it is in Canada or the United States—or even Latin America. So I believe the constraints on IBM's business will come from constraints on the balance of payments, rather than from constraints on energy.

**Q. What happens if a country is caught in a balance of payments squeeze?**

**A.** To give you an example, in Japan last year the cost of energy imported into Japan was about $4-billion. If you look at 1974, to sustain the Japanese economy the cost of that energy will go up to somewhere between $11- and $14-billion. So the Japanese are faced with the problem of either increasing exports massively to make up for that balance of payments drain or to limit their imports. And in any constraint situation of that kind, I believe that not only will computers be affected, but every other kind of business. This is the most serious threat to IBM's overseas business.

**Q. Are there any solutions?**

**A.** Yes. Again, looking at the two pieces, the first solution is to open up the flow of oil from the Middle East. I believe that will happen. If you look at the balance of payments problem, the obvious solution is to lower the price of crude oil so that all nations can buy what they need at a price they can afford. I believe there will be severe pressure on the Arab countries. I have no hope, however, that the cost of a barrel of crude oil will go back to where it was in January of 1972. But I am optimistic that the Arab nations will understand it is in their best interests not to disrupt the entire world economy.

**Q. You spoke for IBM before the Senate Subcommittee on International Trade. How will IBM be affected by impending foreign trade legislation in Congress?**

**A.** I'm very optimistic that Congress this year will pass a trade bill which will be in the best interests of the United States. I believe that all the issues raised by the Burke-Hartke Bill have been put in perspective by most of the Congress and I feel the outcome will be a constructive bill which will allow the President to negotiate at the Geneva Conference from a position of strength. I'm not optimistic enough to believe there will not be other constraints on international companies.

**Q. In 1970, the World Trade Corporation passed the U.S. company in net earnings. This has continued. What are the prospects for World Trade as you see them?**

**A.** Our opportunities for growth in World Trade, from an earnings standpoint, are greater than they are in the U.S. company. World Trade has an added dimension that the U.S. company does not have and that dimension is geography. When you look at World Trade there are many, many countries where the development of data processing has lagged far behind that of the United States, and Canada, Japan, and Germany.

**Q. In 1973, World Trade provided 54 percent of IBM's earnings and 47 percent of its income. Do you foresee a time when World Trade will surpass the U.S. company in revenues?**

**A.** That question can best be answered by statistics. If you make the assumption, which I do, that the percentage of increase in the percentage of growth, will continue to be higher in World Trade than it is in the U.S. company, then you can only reach the conclusion that at some point World Trade is going to supply more revenue than the U.S. company does. However, I don't want to conjecture when that will be.

**Q. To which countries do you look in the near future for the greatest growth?**

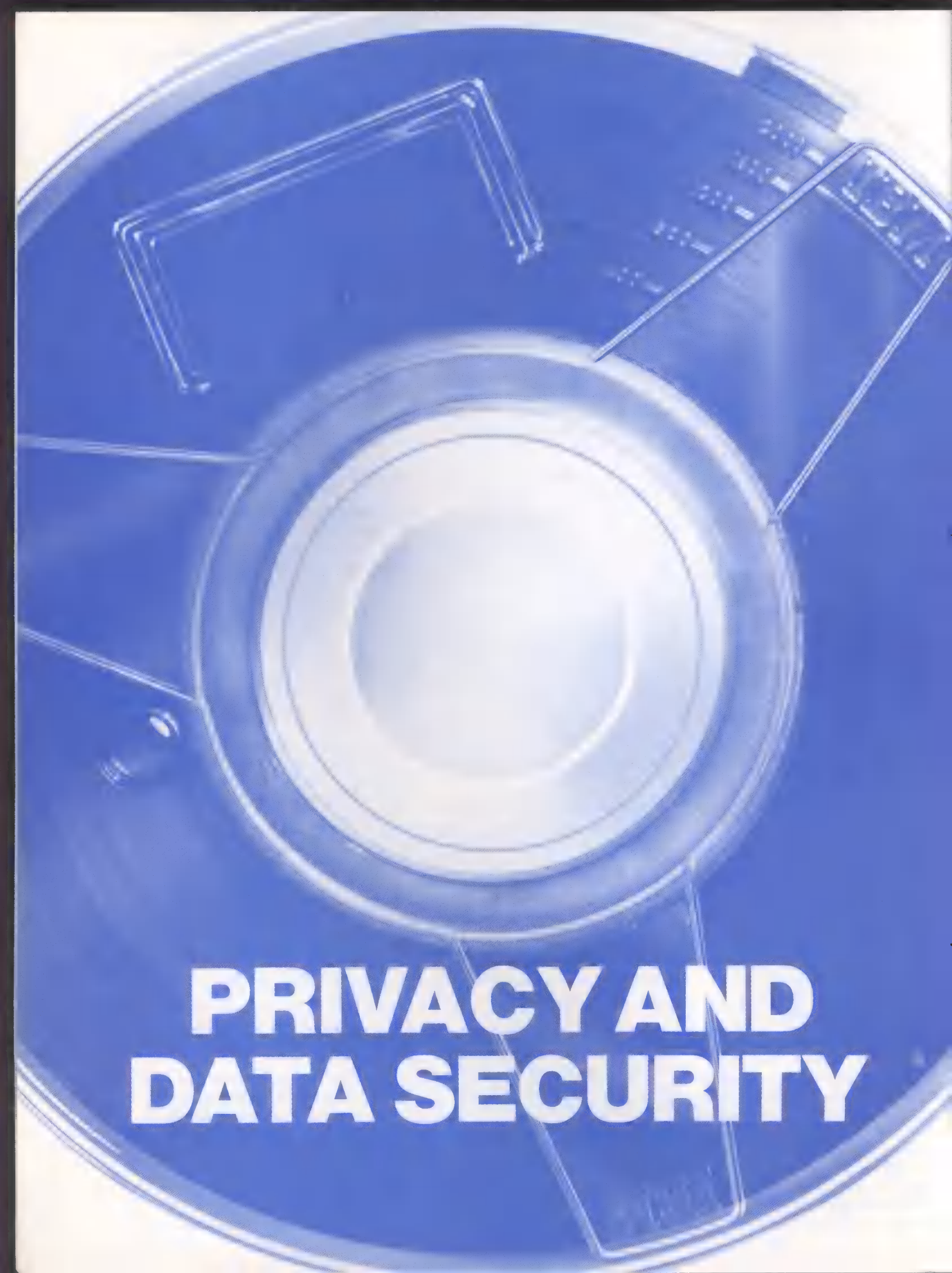
**A.** From a percentage growth basis, the three areas are Latin America, the Mediterranean countries, and the new geography where we have not really scratched the surface—in Eastern Europe and the Socialist bloc.

**Q. What do you see ahead for the company, especially in terms of the challenges we face?**

**A.** It's hard to put them in order, but obviously the lawsuits loom large in everyone's mind. Many people think they are the biggest challenge. Personally, I don't. I think we will come out ahead in the lawsuits. So I really put that one down as a huge challenge but one that we will learn to live with. Secondly, I look at the challenge of technology. Every year I've been in the company, technology has moved faster than it has before, with no exceptions. And at this point in time, we are on the leading edge of a technological wave that is sweeping our industry. I think from an internal standpoint that the ability of the company to ride that technological wave—that is a key challenge. It will have a lot to do with our success in the future. Third, I think the economic environment, the crisis of shortages, the crisis of an unstable monetary supply, the crisis of the balance of payments—these are all situations the IBM company will have to learn to live with.

**Q. Of all the situations we face, which do you think most challenging?**

**A.** Management. The ability to have a growth company and yet have a management team that is able to share the responsibilities so that more people nearer the problems of the day can solve those problems quickly and not become mired down in a bureaucracy that prevents us from moving. ■


PRIVACY AND
DATA SECURITY

# 'What's in a name?' Plenty these days if it's yours and it's stored in a computer.

**by Geoffrey D. Austrian**

It came as something of a surprise last summer when Massachusetts refused to hook up its statewide criminal information system to the Computerized Criminal History file—part of the F.B.I.'s National Crime Information Center. Massachusetts Governor Francis W. Sargent, and four members of Congress charged that the national system permitted the dissemination of sometimes inaccurate and outdated criminal records, failed to prevent unauthorized access to the files, and did not allow individuals to review and correct their files.

The F.B.I. denied the charges, and although the Justice Department at first urged Massachusetts to open its files to any Federal agency that wanted them, Elliot Richardson, then Attorney General, soon set about drawing up more stringent rules for the protection of individual privacy. The effort has been pursued with equal vigor by Richardson's successor, William B. Saxbe. And recently, President Nixon set up a high-level committee under Vice President Ford to forge what he called a "personal shield for every American" against invasions of privacy from any source—including the Federal Government.

The growing conflict between freedom of information and the individual's right to privacy—which had existed long before computers—has been receiving front-burner attention from both major political parties. In this atmosphere of aroused concern, Dr. Lewis M. Branscomb, IBM vice president and chief scientist, testified on January 29 before the Subcommittee on Foreign Operations and Government Information of the House Committee on Government Operations.

"Privacy is the end we would like to achieve; security . . . is the means," he said in response to a question from Committee Chairman William S. Moorhead. "There is a need to have privacy guidelines in place," Dr. Branscomb added. "If the objectives [of privacy] are clearly defined, then the information-handling tools will be developed. But if we attempt to legislate what those [data security] tools might be," he continued, "all data processing systems may contain those features—but there would still be no guarantee of how the system would be used to protect society."

In his testimony, Dr. Branscomb said that IBM is in general agreement with the need for privacy guidelines to protect sensitive information about people. However, he emphasized that any guidelines should be applied to manual as well as electronic files. " 'Even in almost totally computerized systems . . .' " he commented, quoting from a National Academy of Sciences (NAS) study, " 'the files considered most sensitive . . . are stored only in manual form . . . thus any attempt to set rules of privacy, confidentiality, or due process that focuses exclusively on computerized records . . . would be inadequate and misleading.' "

Dr. Branscomb's statement was only the latest in a dialogue to which IBM is no newcomer. As far back as 1967, Dr. Emanuel R. Piore, former IBM vice president and chief scientist, testified on the subject before a Senate subcommittee. And, in 1971, Nicholas deB. Katzenbach, IBM vice president and general counsel, told a Senate subcommittee, headed by Sam J. Ervin Jr. (D-N.C.): "We have to face more squarely . . . the basic questions of who can keep information, under what conditions and safeguards, for what purposes." However, while many of the questions have remained the same over the years, the responsive actions expected by a public increasingly aware of unauthorized surveillance, wiretapping, and other infringements of personal liberty, are shifting rapidly.

Despite high public interest, the law has had surprisingly little to say on the subject of privacy and record-keeping over the years. The right to "privacy" is not mentioned in the Constitution, though various aspects of privacy are protected under it. And, in the past, both Federal and state courts have held, almost without exception, that individuals have had no right to prevent the recording of personal information on themselves by government agencies or by private organizations.

"Furthermore, the concept of privacy as it has emerged at law," comments David B. H. Martin, special assistant to the Secretary of Health, Education and Welfare (HEW), "is simply irrevelant to record-keeping. It does not illuminate any approach to balancing the interests of individuals, organizations keeping the records, and the society in what kinds of records will be made, and what use will be made of them."

Laws relating to privacy and record-keeping were virtually nonexistent when the electronic computer burst on the scene. Clearly, a new legal framework would have to evolve. Com-

mented former Attorney General Ramsay Clark: "The law on privacy is like a wandering minstrel—a thing of shreds and patches—tortuously trying to apply old theories of law to conditions beyond their philosophies."

The environment began to change in the mid-'60s with the emergence of the "databank issue." During 1966 and 1967, Congressional hearings were held on proposals to create a National Data Bank for statistical research. Congress also scrutinized the operations of commercial credit bureaus which compile vast quantities of information on individuals.

Says Alan F. Westin, professor of Public Law and Government at Columbia University: ". . . the 1960s witnessed wide public anxiety over what has come to be called the 'databank issue,' an amalgam of concern about the extent and uses of record-keeping organizations, their move to computers, and possible effects of computerization on rights of personal privacy."

The first phase of the change in the environment, according to Dr. Westin, was a cry of alarm in the industrialized nations by the press, civil liberties groups, and others. The issue, he notes, "was dimly perceived but, nevertheless, vigorously and eloquently presented."

Next came the commissioning of official or private studies to determine how computers were being used and "to begin to see what effects in the handling of records about people the introduction of large-scale computers was having."

Unexpectedly, the studies turned up no new horror stories. The "dossier society," ominously forecast years before by British writer George Orwell in the novel *1984*, was not about to happen. ". . . our clear finding," says Dr. Westin, who directed NAS's three-year study, *Databanks in a Free Society*, "is that precomputer rules have not been altered in computerizing organizations; rather, customary practices have been reproduced with almost mirrorlike fidelity."

But neither did the studies—conducted in the U.S., Canada, Great Britain, France, Sweden, Norway, and other countries—do anything to allay rising public fears of computers. Their speed and large storage capacity, combined with rapid data communication, was seen as encroaching upon personal privacy and confidentiality that had evolved out of a combination of technological limitations and civil liberties rules in precomputer America.

There was a widespread feeling, as a recent report of the Secretary's Advisory Committee on Personal Data Systems of the Department of Health, Education and Welfare pointed out, that it was becoming "much easier for record-keeping systems to affect people than for people to affect record-keeping systems. Even in nongovernmental settings," the HEW report added, "an individual's control over the use that is made of personal data he gives to an organization, or that an organization obtains about him, is lessening."

A clarification of privacy policies, it was widely agreed, was needed. "The privacy issue is not primarily technological," says Larry Thomas, IBM's Corporate director of data security programs, "and it cannot be solved by technological solutions or by computer manufacturers alone. If society is to guard against the misuse of information about people, there must be sound public policies. And the responsibility to shape them must be shared by legislatures, government agencies, computer users in government and industry, computer manufacturers, and private citizens."

In Sweden, where virtually anyone has access to almost all government records about anyone, the first comprehensive law for the regulation of computer-based personal data systems was passed in April 1973. Among the provisions of the Data Act was the setting up of the Data Inspection Board. No one, besides the government, may keep or start up a personal data system without a license from the board. Individuals whose records are kept in such a system have the right to be informed of all uses made of the data about them. They also have right of access to all data about them and the right to challenge the accuracy of information, or to include a statement of rebuttal with the data on file. In addition, the data board will act as an ombudsman for individuals in all matters related to personal data systems. Significantly, no one, outside of the relevant government agency, is allowed to keep records on police matters, psychiatric care, and treatment for alcoholism. The Swedish law also forbids the keeping of any records on a person's religious or political views, except for religious or political organizations, which may keep lists of their members.

While Sweden has taken a far-reaching approach to protecting personal privacy, Great Britain has, so far, decided against the need for new legislation. There, the Younger Committee of Parliament concluded that proposed laws were too constraining to be justified by the present level of the threat to privacy. Instead, the commit-

## What they're saying

"One good gauge of the potency of an issue is the number of politicians who decide to get involved. By this standard the so-called 'privacy issue' is finally picking up strength."

—*The Washington Post*
January 23, 1974

". . . a central file indexed by a person's Social Security number may seem attractive from the point of efficiency, but not if it would open extensive personal data to any casual inquiry. It is past time for effective curbs on big brother."

—*The New York Times*
February 1, 1974

"In the past, the inefficiencies of traditional record-keeping gave individuals at least some hope of escaping their past and starting a fresh life. Records scattered across the geographic landscape were lost, buried, or simply inaccessible. A person had a second chance—if only by default. Today, the growing network of computer record repositories guarantees the immortality of past charges, offenses and suspicions. The data banks will become a kind of prison—a 'record prison . . .' "

—*J. Taylor DeWeese, member Federal Advisory Committee on Data Banks.*
*Harper's* Magazine
November 1973

"Unjustified credit complaints can haunt the ability to borrow, and an arrest record may not be followed by an entry noting acquittal. For a technician with access, a computer will spew forth lists of subscribers, contributors or customers, and a lively industry has grown up buying and selling these lists."

—*The Chicago Sun-Times*
February 4, 1974

"As it becomes easier and easier and cheaper and cheaper for computer users to share their data, the need for preserving proper limits is clear."

—*Christian Science Monitor*
June 7, 1973

"Sweden's new measure, the world's first data bank control law, offers a possible precedent and perhaps warning for a U. S. apparently hurtling toward total computerization . . ."

—*Business Week*
October 6, 1973

Privacy is a socio-legal issue concerning the kinds of information about individuals and organizations that should be allowed to flow into, and through, record-keeping systems of all kinds. It deals with:

How, and what, information will be collected.

How, and by whom, it will be used.

How it can be reviewed, modified, or corrected.

As a corporate citizen, IBM will cooperate in the development of sound public policy concerning privacy. We have a specific responsibility to respect and protect the privacy of our employee and organizational records.

Data security involves the protection of information from unauthorized or accidental modification, destruction, and disclosure.

The responsibility for the protection of data must lie with the organization which controls the record-keeping system that contains the data. It decides what information is collected, who has access to it, how it is to be used, and what methods will be employed to protect it . . . while total data security may not be achievable, a level of protection appropriate to user needs can be achieved in automated systems. Although the customer has overall responsibility for the protection of data, IBM has a responsibility to assist our customers in achieving the data security they require.

* * *

Complex computer systems with large data files have become the focal point of a growing concern for privacy and data security. It is important that we understand these subjects, our responsibilities related to them, and our intent to achieve a position of responsible leadership.

Among other objectives, we will . . .

- assure that data security is a basic design criterion for future systems and products;
- alert and educate customers to the significance of data security and assist them in identifying specific data security needs and exposures;
- cooperate with governments and other appropriate bodies who are seeking to create improved solutions, practices and understanding of data security.

Our overall objective is to provide systems, products, and services that assist the user in preserving and protecting data security and privacy.

*—Frank T. Cary, from the* IBM *Corporate Policy statement on privacy and data security, November 15, 1973*

tee proposed a code of good practice, since adopted by the British Computer Society, a group representing some one-third of British computer professionals. Among its provisions: Information should be held only for a specific purpose; access should be confined to those authorized to have it for that purpose; and the minimum amount of information should be collected and held for the achievement of the specific purpose. The British code is somewhat vague on the matter of access by individuals affected, merely stating: "There should be arrangements whereby the subject could be told about the information held concerning him."

Many data processing professionals and experts in the field of privacy view restrictive legislation as either unwise or impossible to implement. However, foreign approaches to legislation have had some influence on U.S. lawmakers, and bills based on the Swedish law have already been introduced in the U.S.

Dr. Westin believes that the Swedish law is out of keeping with the traditions of U.S. institutions. "For an American," he notes, "the scope of the power that's given to the Data Inspection Board in Sweden is truly breathtaking," having the authority to be the sole judge as to whether there is a legitimate basis for any databanks, unless established by King or Parliament, to collect personal information.

Another brand of criticism comes from technical experts who contend that, under certain proposed legislation, computer files would have to be enlarged to such an extent and computer performance be impacted so severely that restrictions would be far too costly for users to absorb.

Comments Dr. Ruth M. Davis, director of the Institute for Computer Sciences and Technology of the National Bureau of Standards: "It is an empty exercise to pass legislation that is technically impossible to implement. Similarly, it is just a technical tour-de-force to design [data security] equipment or procedures that are too costly to use."

Initially, the U.S. appears to be developing privacy principles on an industry-by-industry basis. Commercial credit reporting; banking privacy and security; and controls on criminal justice information systems have each been the subjects of separate legislation. The Fair Credit Reporting Act, which became law in April 1971, is regarded as the most extensive passed on the national level. It gives people, for the first time, the right to be told what is recorded about them in the files of credit and inspection agencies and to challenge inaccuracies.

Today, interest in privacy legislation is so intense at all levels of government that some observers are fearful a crazy-quilt pattern of laws may emerge. Some 70 bills concerned with protection of individual privacy were pending in the 50 state legislatures in 1973.

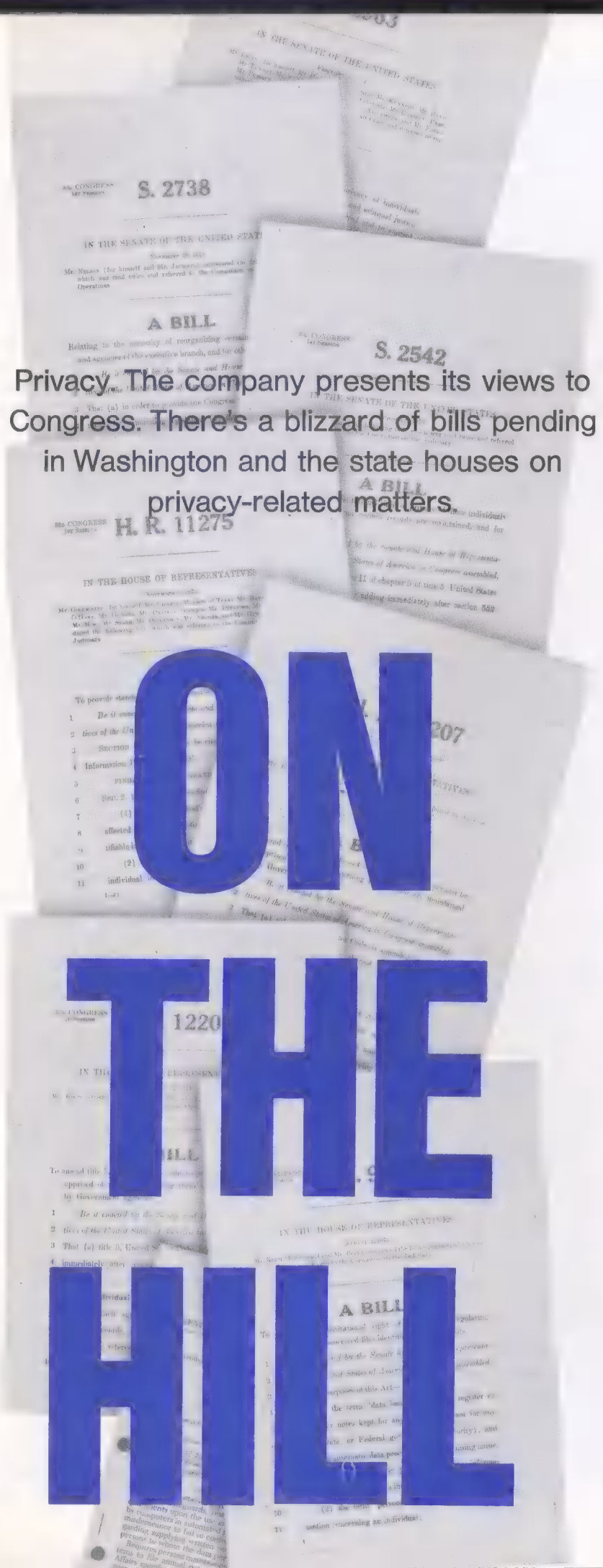
"Passage of any significant number of these bills, along with passage of some of the bills introduced into Congress," Dr. Davis comments, "could easily result in an unacceptable morass of conflicting requirements . . . Some national coherence must exist for any realism to be present in arriving at security in automation adequate to protect individual privacy."

Federal legislation on privacy may be the only way to avoid such a hodgepodge of conflicting laws. The Advisory Committee to HEW has come up with a Code of Fair Information Practice. The basic provisions of the code, published in a report, *Records, Computers and the Rights of Citizens,* issued last July, have already found their way into legislation introduced at both the state and Federal levels.

Those within IBM concerned with privacy and data security issues consider the evolution of privacy principles an important step in resolving these issues. And they feel that any information practices that are adopted should take fully into account the variety of existing information systems as well as greatly varying user requirements.

"Guidelines for information practices for both manual and automated systems," Dr. Branscomb advised the subcommittee, "should be established and tested by government bodies, user groups, manufacturers, and others seeking to resolve ambiguities of interpretation in practical cases." In other words, a broad consensus should be developed as a prerequisite to privacy legislation.

Clearly, a proper balance should eventually be struck between the increasing demand for social and commercial services, relying on the computer, and the age-old desire to be left alone. "In many circumstances in modern life," the HEW report concludes, "an individual must either surrender some . . . control or forego the services that an organization provides. Although there is nothing inherently unfair in trading some measure of privacy for a benefit, both parties to the exchange should participate in setting the change." ■




## Privacy. The company presents its views to Congress. There's a blizzard of bills pending in Washington and the state houses on privacy-related matters.

The issue of privacy, most people will agree, has become one of widespread concern. Since January 1973, five Congressional subcommittees have held public hearings on privacy-related bills. Already, 283 Senators and Representatives have sponsored bills relating to privacy. The most recent hearings opened in January before a subcommittee of the House Committee on Government Operations headed by Rep. William S. Moorhead (D-Pa.). Dr. Lewis M. Branscomb, IBM vice president and chief scientist, is one of two dozen witnesses who have appeared before the three sets of hearings held by the Moorhead Committee. Branscomb cited the IBM Corporate policy on privacy and data security. Excerpts from his testimony follow:

### Privacy and data security: The background

Privacy and data security are clearly different issues. One reason these issues are so difficult—and important—is that evolving technology makes possible new tools that people find useful and beneficial, and these new tools in turn permit the evolution of new social values, some of which may be in conflict with others. This point was made very well by Undersecretary of Commerce John Tabor in testimony before this committee last July, when he said:

*". . . we must design our information systems with the goal of resolving one of the most vexing problems of our post-industrial society; namely, the information paradox resulting from the demand for: Freedom of information, privacy of information, integrity of information, and copyright protection. These four goals could be mutually incompatible . . ."*

The development of a consensus on how information should be managed and used in our society must go hand in hand with the evolution of the technology and the services it makes possible. The first is the responsibility of legal and governmental institutions. The second is primarily a job for the private sector. Since both law and technology are advancing simultaneously, and must be mutually consistent, the need for cooperative effort is evident.

It would be a mistake to conclude that the use of modern electronics in communications and information processing systems permits easy solution to all the technical problems

we encounter. Progress in electronics makes it possible to develop systems designs and controlling software that provide much better protection against man or machine failures than was possible in the past.

The value of such *data security* features, however, clearly depends on establishing consensus on what we want the system to do—that is, on the principles governing the policies and actions of the people and organizations using the information technology. Such questions are usually referred to as questions of *privacy*. Good system security may be indispensable to the implementation of strict privacy objectives. But there is no way privacy can be built into the hardware of an information system.

The task of defining concepts or practices of privacy and fair information management deals with the public's right of access to information as well as the individual's right of restricted access to information about himself. It touches on the quality and economy of public and private services bearing on almost every area of human activity. Both privacy and data security must be dealt with through flexible instruments that permit their evolution in mutual interaction.

## How they relate to the computer

The computer will be called upon increasingly by both business and government to help meet growing information-handling needs. There are four basic reasons for this:

- The computer's capacity to store vast amounts of data.
- The computer's ability to consolidate files for subsequent access. For example, the Social Security and Medicare programs each process files for 30 million beneficiaries. The programs couldn't operate within their current scope without the aid of computers.
- Perhaps most importantly, computers have given the user the ability to manage information dynamically. Information can be kept up to date and made available when it's needed—to confirm an airline reservation, for example. Previously, it may have taken much longer or may not have been practical at all.
- Computers can permit economical access to individual records, making it technically possible to provide individuals information about their own records on request.

Perhaps the most publicized outgrowth of the computer is the concept of the centralized file, where great volumes of data can be stored under control of a central computer and then accessed by a number of remotely located terminals. Some government agencies have made great strides in developing public services based on information systems of this type. For example, the National Clearinghouse for Poison Control Centers, a part of the Food and Drug Administration, stores data on 7,000 non-food products that contain toxic ingredients. This information is available through terminal access to 580 Poison Control Centers scattered about the country. These centers receive thousands of requests from physicians and the general public, and save many lives because of their quick response in emergencies.

The same capabilities that have advanced some of the best of our public programs, however, do pose serious questions about the precautions required to protect individual privacy.

## Some basic principles regarding privacy

Reports addressing the privacy issue have been published by four important bodies in the U.S., Canada, and the United Kingdom. IBM supports the basic principles advanced by these studies:

- An individual should be given right of access to information about him contained in record-keeping systems and a way to find out how the information is used.
- There should be a way for an individual to correct or amend a record of identifiable information about him.
- There should be a way for an individual to prevent information about him that he provided for one purpose from being used or made available for other purposes without his consent.
- The custodian of data files containing sensitive information has a responsibility for endeavoring to maintain the reliability of the data and to take precautions to prevent misuse of data.

These evolving principles must, if they are to provide the desired protection to the individual, apply to manual as well as electronic files.

## Application of these principles

Translating these general principles on privacy into specific guidelines will not be easy. It is essential that interpretations of the guidelines not be so narrow that they restrict an organization from using personal data about employees in broad statistical studies or in other ways appropriate to the normal conduct of the business.

Obviously, such interpretations should be done with an eye toward the effectiveness of any information services an organization must provide. For these reasons, it is essential that the users—government agencies, banks, hospitals, insurance companies, and so on—be well represented in discussions of the practical implementation of principles.

There is another very important reason the users must be deeply involved: Only they can assure the accuracy and pertinence of the information contained in the file. Both the usefulness of the service and fairness to the citizen require that the data supplied to the system be correct. Assuring that this is so and that the system is secure is a challenge to every user of information or provider of information services. In this area we find the greatest likelihood of well-intentioned human error.

It is my hope that, whatever the best judgments are relative to privacy legislation, the legislators arrive at some national uniformity in their thinking. Dr. Ruth Davis of the National Bureau of Standards addressed this issue very well in her talk before the recent NBS conference on privacy and security. Dr. Davis stated:

*"In 1973, some 70 bills concerned with protection of individual privacy were pending in the 50 state legislatures . . . Some national coherence must exist for any realism to be present in arriving at security in automation adequate to protect individual privacy."*

## What is data security?

Data security deals with the procedures and facilities for protection of information from unauthorized or accidental disclosure, modification, or destruction. In both business and government, there is a need to protect nonpersonal as well as personal data.

Historically, the security of an information system depends on a combination of the following:

- Normal procedures of business and accounting control. These include a series of checks and balances—audit procedures, division of responsibilities—to detect the presence and limit the consequences of errors and negligent or willful wrongdoing.
- Traditional physical security measures such as guards, identification cards, locked doors, fire and theft protection, and employment of reliable and trustworthy people.
- If the information system utilizes a computer, the technical capabilities of the computer system itself.

The first two should be an element of any well designed security program for protecting information. In fact, adequate security for both manual and computer-based files can often be attained through the use of good physical security and operating and accounting procedures alone.

Overall, the organization controlling the information system has the ultimate responsibility to determine the need for security measures appropriate to its particular situation and the degree of confidentiality it and its customers require. It then selects the combination of operating procedures, physical security measures, hardware devices, and programming tools appropriate to its particular needs.

There is no such thing as perfect security. But an appropriate level of protection may be achieved. The objective of a data security program is to cut the risk and probability of loss to the lowest affordable level and be able to implement a full recovery program if a loss occurs. In determining affordable cost, one must include not only special facilities, but also any system performance burdens and added personnel costs.

## What are some data security techniques currently available in IBM equipment?

- Terminal devices used to communicate with the computer are often in remote locations. We can verify the identity of a person using a terminal. This may be done by using a password or code number, and in some cases by using a key or an identifying badge.
- Another data security capability is verification of an individual's authority to do what he is requesting. The computer can be instructed to limit his access to certain files or certain portions of files. He may also be allowed to read certain files but not to make changes in them.
- A computer can be programmed to check its own operations and to detect attempted violations, whether intentional or accidental. In the case of an unauthorized attempt, the violator can be automatically disconnected from the system.
- Confidential data being entered into display terminals could be observed by unauthorized people. To protect such data, we have the means to inhibit the display of selected portions of the data or all of it. It can also be erased after a specified time.
- A feature already incorporated into banking system cash dispensing terminals is a communications protection device. The data are coded during their transmission to a receiving unit. The unit then decodes them for final processing. If the communications line is tapped, the device prevents unauthorized signals from causing the dispensing of cash.

We are working to improve the data security capability of currently available products and have made data security a basic design criterion for future systems and products. Each design group for new IBM computer systems has a basic responsibility for data security in that system, just as it has for safety, reliability, availability, and serviceability.

Although we recognize that technology alone cannot prevent the abuse of information by authorized persons, it can provide for journaling and auditing techniques which can serve as effective deterrents. It is also true that, under certain circumstances, a computer expert with access to systems in use today may be able to gain entry to the computer's control system, and through it, unauthorized access to information. We recognize this problem and are working on effective safeguards.

## What are some other actions IBM has taken?

At the 1972 Spring Joint Computer conference, T. Vincent Learson, then chairman of the IBM board, committed IBM to an investment of some $40-million over a five-year period to study requirements for data security and to further develop appropriate safeguards for IBM products.

A part of that investment has gone into a two-year joint study program, which will be published this summer. M.I.T., the State of Illinois, and TRW are working jointly with an IBM laboratory in Gaithersburg, Md., each one giving special emphasis to a particular aspect of data security.

At the Massachusetts Institute of Technology, we are concentrating on authorization, addressing the question: What controls are necessary to limit users to the specific parts of a system required for their jobs?

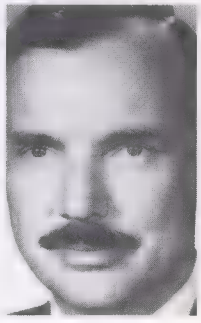
A second study by the Management Information Division of the State of Illinois covers the requirements and economics of data security. What are the cost tradeoffs and what will be the administrative and organizational effects?

In our work with TRW Systems, the third study site, we are asking: How can you measure how secure a system actually is? We would like to quantify the required degrees of security.

The fourth study, at IBM's Federal Systems Division laboratory in Gaithersburg, is measuring the impact of a complex array of security measures on a large, on-going data processing operation with extensive remote terminals and multiprogramming.

We expect these studies to answer only a few questions. But the understanding we reach on data security requirements as a result of this work will be placed in the public domain and, hopefully, will be of assistance to the entire data processing industry and computer users as well.

Overseas, IBM Sweden and other manufacturers have entered into a three-year joint study program with the Swedish Government to try to determine which specific



*Dr. Lewis M. Branscomb came to* IBM *in May 1972 from his post as director of the National Bureau of Standards, a part of the U.S. Department of Commerce that works to strengthen the nation's science and technology and facilitate their effective application for public benefit. A Duke University graduate, Dr. Branscomb received a Ph.D. in physics from Harvard in 1949. He is a member of the Council of the National Academy of Sciences and a Fellow of the American Academy of Arts and Sciences.*

methods and techniques will be needed to meet the requirements of Sweden's national Data Act of 1973.

We have been providing other computer users with educational materials, advice, and assistance.

We have developed a Data Security Awareness program. Briefings and discussions by our marketing organization alone have been held with over 200 companies, and 40 computer user and industry groups. These have involved an estimated 1,750 people. The program has included the publication of several brochures on data security.

In April 1973, we initiated a Data Security Symposium. We had hoped to find 30 computer users interested enough to submit papers on their data security needs and experience. We had 100 responses. This and continued interest has led to three subsequent symposia. Thirteen government agencies have participated, including the National Bureau of Standards and the Department of Defense.

### Suggestions and considerations on resolving the major issues

I would like to speak to some policy considerations relating to privacy principles, fair information practices, and data security.

One of the most difficult considerations in developing practices is the fact that there is such a variety of information systems. They range from the telephone book, with the need for quick and easy public access, to a large government data collection of very sensitive information to be accessed on a very limited basis.

What kinds of rules or practices will provide for the efficient use of both? I believe there has to be some way to differentiate, possibly according to the purpose and use. And I have to admit to you that I don't know how that can be effectively accomplished.

It has been suggested in the HEW committee report that certain detailed questions such as these should rely in part on the courts, once general guidelines have been enacted into Federal legislation. I prefer this approach to the alternative of leaving this up to interpretation by a government agency or official, since constitutional rights of citizens are so directly involved.

I do, however, urge a better alternative: The Congress should seriously try to carry the consensus process a step further, and attempt to resolve the major issues surrounding the interpretation of the principles as they may arise in practice. The guidance given to agencies, businesses, and the information industry must be capable of clear interpretation without the long delays of litigation to develop interpretations of Congressional intent. All these groups and representatives of the public should participate in this process, with the aim of developing a prompt consensus concerning the issue of privacy and related information practices.

What government action is needed in the area of computer security?

The principal need, in our opinion, is for the government to continue to strengthen its own technical capability, to insure that its own operations set a high standard, and to support the development of privacy principles that reflect a thorough understanding of the technology and economics of information systems.

In our opinion, there is no need for legislation in the data security area. Certainly, improved technology for data security will be forthcoming. Clarification of an organization's security obligations—expressed in functional terms—will stimulate a variety of technical solutions from a highly competitive industry. ■

# Five points

Here's how Dr. Branscomb summarized IBM's views on privacy and data security in concluding his testimony before Congress.

**1** Any consideration of privacy issues must embrace manual as well as electronic data files. Since most senstive personal data is still processed manually, it would be counter-productive to have legislation which would encourage the use of sensitive information in manual systems outside the reach of privacy guidelines.

**2** The proper balance has to be found between limiting access to information for the protection of privacy and allowing freedom of information to protect the public interest, and to permit users to meet the needs of society and to provide good service.

**3** Information practices relating to privacy and guidelines for the security of data should take into account the fact that most information systems do not contain personal data, and of those that do, information files range in nature from the trivial to the complex and sensitive.

**4** Guidelines for information practices should be established and tested by government bodies, user groups, manufacturers, and others seeking to resolve ambiguities of interpretation in practical cases. This is a prerequisite to constructive legislation.

**5** There is a need for national uniformity for both privacy legislation and information practices guidelines.

# Real world

One truly international language is the language of scientific research. They speak it in the Research Division.

**by Stanley L. Englebardt**

It is early morning on a clear winter day as two men, deep in conversation, walk across the grounds of the Thomas J. Watson Research Center in Yorktown Heights, N.Y. One of the men is a professor at a leading university, working at the Center as part of an IBM visiting fellowship program for men and women who have received a doctoral degree in one of the sciences. The other is a professional member of the Center's staff whose interests are in the same area. The ideas they are exchanging will benefit both of them in their present and future work. This is an example of the kind of scientific exchange that is going on in the IBM Research Division.

"A visitor to the Center once remarked that the people—both IBMers and others working here—represent an 'aristocracy of scientific excellence,' " says Dr. Varadachari Sadagopan, manager of scientific relations for the Research Division. "Maintaining that excellence these days, however, requires special effort.

"One way the Research Division is meeting this challenge is through several programs designed to attract outstanding post-doctoral and established university scientists for periods rang-

*Astrophysicist Dr. Charlotte Gordon, professor at the University of Paris: "Everybody is curious about the stars."*

ing up to two years. These programs have a two-fold purpose: to help support the technical vitality of IBM's Research Division laboratories in Yorktown, San Jose, and Zurich, Switzerland, by bringing in creative ideas; and to expand the horizons of the visitors by exposing them to the work of IBM's scientists.

"The company benefits directly," he adds, "because we get men and women with new ideas in research. They give us an enormous amount of intellectual stimulation. This results in what we call increased technical vitality to the existing staff. This is of prime importance to the division's mission and helps IBM in the long run."

A native of India, Dr. Sadagopan came to America in 1958 as an exchange student and decided to remain. A 1964 graduate of the Massachusetts Institute of Technology in the field of material science, he joined IBM in 1968. Prior to that he served as special assistant to the Secretary-General of the United Nations Conference on Applications of Science and Technology for Developing Nations. Since he arrived at Yorktown, he has been a research staff member, working on new materials for memory, logic, and display applications.

The Research Division, Ralph E. Gomory, IBM vice president and director of research, points out, divides its efforts between pure science and advanced applied projects.

"The 'pure' researcher is often motivated by the desire to find something out and simply tell us about it," explains Dr. Gomory, "while the 'applied' researcher is hoping that the effect can be used on something. Either way, our aim is to push forward in these areas, to generate new ideas, and to bring scientific advances into IBM from wherever they occur. These visiting programs are an important part of this effort."

In structuring the post-doctoral and other distinguished visiting scientist programs, Dr. Sadagopan explains, the key assumption is that innovation and renewal take place best when individuals move into new environments and interact with new stimuli.

The largest number of these people —about 80 each year—come from the post-doctoral program. In both the U.S. and in IBM World Trade countries, it is designed to attract recent doctoral graduates in scientific areas for periods ranging from one to two years. Dr. Stephen C. Wallace, for example, earned his Ph.D. in chemical physics at the University of British Columbia where he concentrated on research in radiation chemistry. Aware that IBM was doing advanced work in this area, he applied for a "post-doc" position.

"IBM's Research Division is well known in scientific circles for its high quality work and stimulating environment," Dr. Wallace says. "I felt that the exposure would provide me with invaluable theoretical and experimental experience."

Dr. Wallace, who began his work at the Center in July 1972, shares a career in science with his wife, Prof. Geraldine Kenney-Wallace, who is an assistant professor of chemistry at Yale University. He makes the following comparison between the Research Center and universities.

"In an academic environment," he says, "most research is done on an individual basis. At IBM, I have the advantage of talking to and working with many others who are extremely advanced in my field. This kind of exchange not only accelerates the work, but also serves to continually enhance my own knowledge of physics."

Similar benefits have been observed by Dr. Peter Meier, who is on sabbatical from the University of Zurich where he specializes in theoretical physics. A participant in the IBM fellowship program at the IBM Zurich Research Laboratory, he says he finds that the contact he has with IBM experts is among the most important advantages of the program. "At a university you have to go to conferences or arrange special meetings in order to exchange information," he says. "Here I come in contact with other scientists in my field on a daily basis. Moreover, it's most fruitful for me to have a lot of contact with experimentalists. For the first time I can follow the progress of their work and relate it to my own theoretical experience."

Dr. Meier, as most other contract scientists who work with the Research Division, expects to return to the university at the end of the fellowship period.

In many ways, the post-doctoral program serves as an extension of the campus. Dr. Hayo Giebel, who earned his Ph.D. in cybernetics at the Technical University of Munich and is currently at the IBM San Jose Research Laboratory, says that his university has had excellent relations with the company for many years. "Several of our people have either joined IBM or gone into the post-doctoral program," he adds.

Dr. Giebel's appointment was initiated by a professor who has worked closely with the Research Division on several occasions.

Dr. Giebel is particularly pleased by his assignment to the San Jose Research Laboratory because of its proximity to several universities where there is advanced research going on in his field. "There are a number of scientists in this geographic area with whom I communicated while in Munich," he says. "But because of the distance involved it was hard to establish close relations."

In San Jose, however, he is able to see and speak with them. "This has resulted not only in enhancing my own personal project, but in establishing a better two-way channel of information for other scientists in the IBM Research Division," he says.

*Dr. Stephen C. Wallace, who earned his Ph.D. at the University of British Columbia, uses a blackboard to illustrate the operation of ■ pulsed gas laser. He welcomes the learning atmosphere of the Research Division.*

*Dr. G. S. Cargill III of Yale University found that his campus work with amorphous solids was closely related to a magnetic bubble technology project at* IBM. *He says that "this has added considerable spice to my work."*

What are his plans after his San Jose stint? Dr. Giebel laughs. "They wouldn't let me go without the assurance that I'd return to the university to continue with my work." When he does return, he's scheduled to head a special project studying the human visual system. Meanwhile, he's using the computers at San Jose to simulate the chemistry of other neural systems —an effort which might lead to totally new forms of computer memory.

Not all appointments are made on the basis of how they relate to data processing technology, according to Dr. Gomory. Many of the projects underway in the Research Division are aimed at science. "We do this," he says, "to be part of the world of science, discovering new effects, new measurements, and new phenomena."

One example of this is the work of Dr. Charlotte Gordon, professor of astrophysics and plasma physics at the University of Paris, who is presently at the Thomas J. Watson Research Center on a one-year Eckert Fellowship. This Fellowship was established two years ago in the name of the late Dr. Wallace J. Eckert, a pioneer in the scientific use of computers, who carried out the most precise computation of the lunar orbit, revealing a 440-foot error in prior calculations of the moon's path. Dr. Gordon is carrying on astronomical research on supernovae, or exploding stars.

"The facilities here are excellent for my type of investigation because of the tremendous amount of computer power available to me," she says. "Another advantage of the Center is the presence of so many other physicists who, although not actually working in my field, have enough background and interest in astrophysical work to trade ideas. As a result, I've been able to move ahead with my calculations at a much faster pace." Dr. Gordon says she enjoys the drive up through the Westchester County countryside every morning. "I use the time to collect my thoughts and plan the work."

For Dr. G. S. Cargill III, of Yale University, the one day a week he spent at the Thomas J. Watson Research Center last year meant a great deal. His interest in amorphous solids was closely related to the magnetic bubble technology project at IBM. This fact prompted one IBMer, who had spoken to Dr. Cargill at a scientific meeting, to suggest the idea of his joining the company on a summer program, enabling him to continue teaching and do research at the Yale Becton Center for Engineering and Applied Science.

"It had never occurred to me that my work might have application to computer memories," he says. "But IBM had already seen the potential and was moving in this direction at the Research Center. This has added considerable spice to my work because it now is a project with a clearly applied goal."

As so many others, Dr. Cargill is impressed by the ability of people at the Center to get things done quickly in contrast to campus research where scientists usually work on their own. "In addition," he says, "here you have the benefit of highly skilled technicians, while at the university you're usually working with graduate students who need considerable guidance."

All scientists interviewed—whether on a summer, post-doctoral, or fellowship program—stressed the fact that it is a two-way street. "I feel I'm making an important contribution to IBM because of my background and experience," Dr. Cargill sums up. "At the same time, though, my own horizons have been extended considerably.

"What can I do with this new knowledge? One important thing will be to extend it to my students at Yale through a better perspective of the industrial environment—and through the experience of seeing theoretical work applied to actual projects." ■

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*Stanley L. Englebardt is a freelance writer who has written many articles concerning education and technology. He studied physics at New York University where he received a B.S.*

Although Tom Watson, Jr., retired as an active employee at the end of January, he is still chairman of the executive committee of the board, he still has an office down the hall, and he still has IBM very much on his mind.

He remains on our minds, too. Few IBMers who experienced them will ever forget those lively and eventful Tom Watson, Jr., years which began in the mid-1950s, when he became chief executive officer, and lasted a decade and a half.

Tom insisted on a quiet leavetaking from the business. For most employees, it was limited to that two-minute telephone talk at Christmastime. But a number of people have told me they want to know more, what Tom's recollections are and, specifically, what he will be doing.

To mark those years as they ought to be marked, that IBMers who shared in them might once again recall them with pride, I asked *Think* to put together this special section. It's more, perhaps, than Tom would wish. But it's considerably less than those years meant to so many of us. *Think* calls them 'The Tom Watson, Jr. years of IBM.'

*—Frank Cary*

1956 1957

# The Tom Watson, Jr. years of IBM

**by Peter Hillyer**

In 1956, when Thomas J. Watson, Jr., became IBM's chief executive officer (he had been president since 1952), the company already was attracting an unusual amount of attention.

There were bigger organizations, to be sure. IBM ranked a relatively modest 48th on *Fortune*'s list of the 500 biggest U.S. industrials. But it had the intriguing (and to its stockholders and management, delightful) habit of almost doubling in size every four years. What's more, IBM conveyed a can-do spirit that was infectious.

That same year, on his first visit to the company's Endicott plant since his father's death in June, Watson predicted that IBM would become a billion-dollar corporation. And the revenue figures at the end of the next year proved him right.

But even the 42-year-old Watson, steeped in IBM traditions and the management and business philosophies of his father, hardly could have envisioned the spectacular achievements that lay ahead as the company continued its great surge from the age of punched card machines to the world of the computer.

In the 17 years that followed until his retirement this January, the company's gross revenue leaped from $734-million in the United States to almost $11-billion worldwide, and its international population from nearly 73,000 to more than three times that number. The number of countries in which IBM did business grew to 127; plants, laboratories, and offices proliferated at an

amazing rate; new professions appeared and prospered; employee benefits were greatly increased; education for IBMer and customer alike was intensified; and technological advances followed one upon the other.

The company developed and produced a succession of computers, the trickle that began with the IBM 701 in 1953 turning into a torrent of thousands of systems. They enabled firms to do business more efficiently, helped put men on the moon, and materially improved the lot of mankind on earth.

IBM became the bellwether of a new industry, often the standard by which others in it were measured. It provided hundreds of thousands of new and meaningful jobs, not only within the company, but also in many other industries throughout the world.

When asked recently what it was that allowed IBM to zoom to such prominence in less than two decades, Watson explained that the company had been blessed with a nucleus of people with a "very basic systems knowledge who knew how to take devices, once invented, and apply them to the problems of business." This, plus resources which allowed extensive research and development, meant that IBM was in the right place at the right time when it came to taking advantage of the computer's potential. "And, of course," he added, "we had some luck."

True enough. But, as a number of business publications have observed, the leadership was there, too. Other companies with solid pasts and bright futures have failed or floundered. Tom Watson, Jr., together with a cadre of seasoned, dedicated executives, drove, nudged, and inspired IBM into a place of preeminence in the computer age, and provided a restless, challenging, and rewarding environment that attracted outstanding men and women by the thousands.

"Tom was never a technical man," says a colleague. "But he had the imagination and the vision to see what needed to be done, and to find the people who could do it."

*Father and son in 1956, the year that Thomas J. Watson, Jr., became IBM's chief executive officer.*

*Watson and Frank Cary have been business associates for many years. This picture was taken in 1969 when Cary's appointment to the Management Review Committee was announced.*

Even before he had succeeded his father as IBM's head, Watson was intrigued by the computer's potential, and helped bring IBM, somewhat belatedly, into this field.

The ideas that fueled the company's rise came from many sources. But Watson seemed to have an uncanny knack for knowing what was right and what wasn't, what was pure and what was puffery. And he was a risk-taker. "I think," says Watson, "that a continual willingness to restructure, change, and promote was probably my greatest contribution." Whatever it was, it worked.

In 1956, most of IBM's revenue came from punched card machines. Computers were expensive, bulky, vacuum-tube affairs, and there were a relative few throughout the nation. But customers liked them. In the computer business, IBM was discovering, the demand always seemed to exceed the forecast. Modern society was choking on paperwork. And this new kind of machine could help. Orders came in at a steadily increasing rate.

To cope with both company growth and a changing marketplace, Watson met with 110 key IBM executives in November of 1956 for three days in Williamsburg, Va. "We went into that meeting a top-heavy, monolithic company," he says, "and came out of it decentralized."

The company was divided into six autonomous operating divisions, supported by a corporate staff of specialists and supervised by a corporate management committee.

The IBM World Trade Corporation, established in 1949, would continue to operate independently as a wholly owned subsidiary, soon to be joined in this status by The Service Bureau Corporation. SBC was formed to comply with the provisions of the Consent Decree into which IBM had entered early in 1956.

Later, when growth and product characteristics demanded, the company was able to realign itself accordingly, modifying and remolding divisions, adding others, dropping a few, altering and redefining missions. In 1964, IBM acquired a third subsidiary, Science Research Associates, Inc., a creator of educational materials. Last year it sold SBC to the Control Data Corporation as part of the out-of-court settlement of a lawsuit.

From its beginning until now, the basic soundness of the Williamsburg plan has endured—the freedom and quick response of decentralized operations, the support and management guidance of a corporate group.

Organizational reforms were important, and so were the people of IBM. In 1958, IBM became the first major corporation in America to place on weekly salaries all employees still working on an hourly wage basis. It was an enlightened move which Watson described as making IBM truly a one-class company.

"We've spent more time worrying about human resources and human kinds of procedures than we have on electronics or sales procedures over the past two decades," Watson told an interviewer recently. "I think that as long as we remain a relatively personalized company we'll move ahead with good morale in the future."

The late 1950s and the 1960s were extraordinary times for IBM, a period of increasingly sophisticated products, frequent stock splits, explosive growth, and exciting technical breakthroughs. Many of these breakthroughs came about following a recommendation by Al Williams (who later became president of IBM) to plow back a larger percentage of the company's revenue into research and development.

"Al Williams . . . came in one day to discuss something pretty important," recalls Watson. "He pointed out that most well-run companies in high-technology fields were spending 7 to 8 percent on R&D, and we were only spending 3 percent.

"That didn't make sense to us, especially when we were trying to carry this business out of punched cards and into computers. So we hired Dr. Emanuel Piore as director of research and began to push more and more into R&D until we now have a fantastic capability."

It was Watson and Williams who also combined for an across-the-board edict that IBM start making machines with transistors instead of vacuum tubes. "It was a liberal arts kind of decision," says Watson, "a pretty broad decision for a couple of nonscientific types to be making on the basis of being impressed by a couple of Japanese transistorized radios. But it turned out happily."

That it did. One of the results of the switch was the second-generation IBM 1401 data processing system announced in 1959—compact, much faster than its predecessors, and relatively inexpensive, a machine aimed at customers who had never thought "computer" before because of the cost. The orders poured in.

By 1962, computers were beginning to take on much more than the "superclerk" tasks to which so many people had consigned them. Teleprocessing—the transmitting of machine-readable data over long distances—was moving from a concept to a reality. This happened to be another area where Tom Watson, Jr., had felt IBM should be making even more of an effort.

## 'Best speech I ever heard'

As a teenager, Tom Watson, Jr., was no more fond of long-winded speeches than any other youngster. But, accompanying his father to many IBM functions as he did, he listened to more than his share.

That's why the manager of IBM France back in the 1920s won a very special place in his esteem.

"It was a dinner in Paris," recalls Watson, "and the manager, Camille Delcour, had done a remarkable job of making the company profitable.

"Father called on Delcour and he said: 'Mr. Delcour, would you mind saying a few words and telling us how you did it.'

"Well, in my experience this invitation meant a speech lasting from 30 minutes to an hour and a half. But Mr. Delcour got up and he said: 'There is only one formula for success in business, and it can be summed up in three words: *work, work, work.*' Then he sat down.

"It was the best speech I ever heard."

# 1956

**1956**
TJW, Jr., becomes chief executive officer.

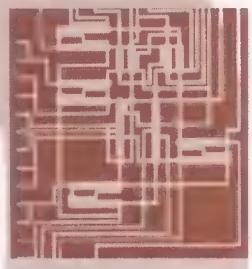
Williamsburg Conference: company decentralized.

**1957**
Income tops $1-billion for first time.

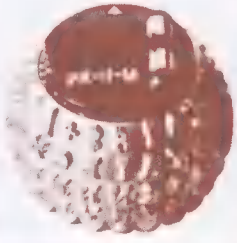
**1958**
All employees formerly paid by the hour are put on salary.

IBM ships one millionth typewriter.

**1959**
Announced: solid-state IBM 1401 data processing system.



**1960**
Worldwide employee population passes 100,000.



**1961**
TJW, Jr., becomes chairman of the board.

The Thomas J. Watson Research Center opens in Yorktown Heights, N.Y.

Typewriter breakthrough: the IBM Selectric Typewriter.

**1962**
IBM joins Plan for Progress to improve hiring of minorities.

**1964**
IBM announces System/360.

IBM acquires SRA.

SABRE fully operational.

**1965**
IBM WTC passes $1-billion mark in gross income.

IBM employee population zooms to 172,000 worldwide.

**1967**
IBM gross income reaches the $5-billion mark.

**1968**
IBM goes to a minority neighborhood, opens Bedford-Stuyvesant plant.

**1969**
IBM announces System/3.

IBM computers help guide moon landings.

New way of charging for, supporting data processing equipment.

**1970**
Company announces System/370 and System/7.

IBM Copier introduced.

A first: WTC net earnings exceed those of IBM U.S.

**1971**
T. Vincent Learson becomes chairman and chief executive officer, the company's third.

**1972**
Virtual Storage: more power, capability for System/370.

Company announces IBM Copier II.

**1973**
Frank T. Cary becomes IBM chairman and chief executive officer.

OPD stars: Correcting Selectric Typewriter, Mag Card II.

IBM announces industry-oriented terminal systems.

Gross annual income exceeds $10-billion; WTC tops $5-billion.

SYSTEM/3

System 370

1973

*The "histograph" at the left shows some of the outstanding advances made by IBM from 1956 through 1973—from the time Tom Watson, Jr., became chief executive officer until he retired as an active employee. Watson stepped down in mid-1971, and was succeeded by Vin Learson who retired from the business at the end of 1972 when he reached 60, the mandatory retirement age for corporate officers. He was succeeded by Frank Cary.*

A key to IBM's continued excellence in its field was the growth of systems and programming expertise within the company, a growth expedited, for example, by the development in the 1950s of the large-scale SAGE computer for the government's air warning system.

In 1964, SABRE, American Airlines' real-time reservations system, became fully operational. It was a new dimension for data processing—keeping track of operations as they happened, not after the fact.

It was also in 1964 that a large contingent of writers, reporters, and editors traveled by special train from New York City to IBM's Poughkeepsie facility for the announcement of what many people consider the company's most important product—System/360.

System/360 has been said to represent the most crucial business judgment in recent years. Certainly, it reversed an industry trend toward a proliferation of different, special-purpose computers, a trend that was making life increasingly difficult for computer users. System/360 was a family of multipurpose, third-generation computers in different sized models that could grow with a customer and would require a minimum of expensive reprogramming.

"A lot of people thought it was a kind of heads or tails thing, that we could have lost everything we put into System/360," says Watson. "That's an overstatement. We could have come out in the red. We could have not made a profit. But, insofar as losing the total gross value of the thing, we couldn't. Because we knew enough by that time to know pretty much what was going to work and what wasn't . . . it did prove to be one of our great, great victories."

Great is an understatement. It was a stunning success. System/360 sold even better than expected. And, although there were problems in programming, circuitry, and deliveries, proved to be an outstanding family of machines with outstanding support. And it provided a tremendous impetus to the already dynamic IBM company.

Between April 7, 1964, when System/360 was announced, and the end of 1967, IBM increased its personnel by more than a third. It opened five new plants in the U.S. and abroad. It became one of the world's largest manufacturers of integrated circuits. It became a truly international corporation, with research, development, engineering, manufacturing, and sales and service capabilities worldwide.

And that *other* part of IBM's business, represented by the Office Products Division, was doing fabulously in the 1960s, helping to balance drooping computer sales at the end of the decade. Started in 1933 as the Electric Typewriter Division, OPD—sparked by exciting new products and the concept of word processing—has become one of the fastest growing segments of the company.

"Some people say all we can sell is computers," Watson told a reporter from *Nation's Business* last year. "But in electric typewriters we have . . . become a world leader. And we have become one of the leaders in dictation machines. We've also gone into copiers, and we're doing well with them."

In addition to OPD's remarkable rise, there was the ascent of the World Trade Corporation, which went from a relatively modest operation at the time Watson became chief executive officer to a contributor of more than half of IBM's net earnings in 1970. In assessing WTC's success, Watson emphasizes the roles played by two people: his father, who saw the potential there, and his brother, Arthur K. (Dick) Watson, who served as WTC president, then chairman, from 1954 until 1970.

In the United States, however, the late 1960s brought the hard reality of increased competition aimed at IBM's computer business by leasing companies and by firms producing peripheral gear that could be attached to IBM systems. The economy took a downward turn. And IBM was having some trouble adjusting to a new method of charging for systems and systems support.

The result: a flat 1970 and 1971, a slowing of the renowned IBM growth. But a new leanness, brought about by economic necessity, and some superior new products led the way to a greatly improved performance for the next two years.

In 1969, IBM announced System/3, a small machine destined to become, in a few short years, the most popular IBM computer of all time.

System/3 was followed by System/370, compatible with System/360, but superior in technology, power, price, and performance. And then IBM announced virtual storage for System/370, a boon to customers since it provided, at little additional cost, almost unlimited storage capacity—a necessity for advanced applications.

In June of 1971, Tom Watson, Jr., relinquished the chairmanship of IBM and was succeeded by his longtime colleague, T. Vincent Learson, one of the people he credits for much of IBM's success over the years. Watson then became chairman of the board of directors' executive committee, and, on reaching the age of 60 this January, retired as a regular IBM employee (although he continues as executive committee chairman).

Watson joined IBM 37 years ago, served as chief executive officer for more than 15, headed a company that has become one of the great success stories of the Twentieth Century.

"Problems? Of course, we've got problems," he told an audience of Quarter Century Club members the year he stepped down as chairman. "Who deserves them more than the most enterprising company in the world?

The success we have today is success achieved when most things were coming our way. It is going to be difficult in the future, when we have more normal pressures. But if this management doesn't stand up to those pressures I would be very surprised.

"I predict that the next 25 years will be just as exciting as the last." ■

# At home

## An informal conversation with Tom Watson, Jr., about IBM, his career, and his plans for the future.

In the study of his white-brick Colonial home in Greenwich, Conn.—a 15-minute drive from Armonk—Tom Watson, Jr., looks out the window and gestures toward a 30-foot pine moving slightly in the light wind.

"See that tree?" he asks. "It was given me by Bob Prescott, the fellow who started the Flying Tigers Line. I planted it myself. It was only a few feet tall. Now look at it."

Before he sits down, he pats the gleaming head of a carved wooden elephant that stands by one of the chairs. "Got this in Africa, during the war in 1942. It cost seven dollars. I bought two. Olive never liked it, and for years I had to keep it hidden in closets. But now we've brought it out."

Watson sits on the sofa, long legs stretched out. It is an unseasonably warm February morning, and the sunlight coming into the room glints off the elephant and other souvenirs, knick-knacks, photographs, and paintings which give the room a comfortable, lived-in feeling.

Watson laughs when it's suggested that the interview may be taking up too much of his time. "Never say that to a retired man. I'm not exactly loafing around, but I've got plenty of time. You know, my doctor always made me feel like he couldn't wait to get through with me so he could look at another patient. He's retired now and I talked with him the other day. I started to leave and he said, 'What's your hurry.' And we talked for another hour. That's the way it is."

At ease, seemingly unhurried, IBM's former chairman of the board goes on to talk about his experiences during 37 years with the company—the management lessons, the wins, the losses, and some of his personal views.

### What are your plans now that you're retired?

TO start with, I'm planning a lot of things that are in the "fun" category. I'm going to do a fair amount of skiing. And beginning about the first of April, I'm going to start preparing for an expedition to Greenland with a lot of young people. I want to work more closely with Brown and Caltech—I'm a trustee at both schools—and I also will be a Woodrow Wilson Professor. This means that I will spend a week at Depauw University in the spring, lecturing and talking to students. This is the kind of thing I like. If it turns out well, I hope to do more of it.

### So you think you'll really enjoy retirement?

I know I will. In a way, my heart attack in the fall of 1970 helped me prepare for this day. It was a strange thing. After a couple of weeks in the hospital, I realized I felt relieved. And this didn't make any sense at all. I called in my doctor and I said, "I must be going crazy." He asked what I meant. I said, "Well, I've had a heart attack and everybody is worried I might die and yet I feel kind of relieved. What's the matter with me?" He said, "I'll tell you what's the matter with you, as I see it. You've had a difficult job and you've never really known how you were going to end it. And now you've had a heart attack and you know you're going to have to start doing something different. That probably is a sense of relief to you because you're a little bit off the hook." I asked him what I should do. He said, "You can go on back to IBM if you want, but you ought to rest a little bit after lunch every day and you ought not to get too excited. But what I'd do if I were you is quit. I would step down." I thought about that for about six months. Finally, I said, "Doctor, you're right." Down I stepped and I've never regretted it.

## What were some of the hardest decisions you had to make as chief executive officer?

WELL, generally speaking, the hardest decisions had to do with people. Who was promoted? Who wasn't promoted? I don't suppose that I've had to deal with, directly, the release of more than a dozen people in the past 25 years. But I always found such a situation profoundly difficult to deal with, and personally distressing.

## What factors do you think have been most responsible for IBM's success?

WELL, I think you have to start in by saying that any great enterprise has to have a modicum of luck. It was fortunate that my father was hired into C-T-R [later IBM] in 1914 with a long background in the National Cash Register Company. That background had given him quite a feeling for the fact there were tremendous numbers of accounting jobs in this country that couldn't be done manually. When father first saw a Hollerith punched card machine, he said, "There's great potential in that machine." When he was hired by C-T-R, he saw the meat grinders, the coffee machines, the scales, and the time clocks. But the Hollerith machine was what really made him take the job. Then we moved along from 1914 to 1940, and the machines were slowly improved. And in that time, IBM built up a group of 300 to 500 men around the world who really understood, given a mechanical vehicle, how to mechanize an accounting job. Then, when the end of the war came and electronics were available, we were able to move at a much faster rate with those devices. A factor, perhaps, most responsible for IBM's success was that we had very basic systems knowledge and the fundamental idea of how to take devices, once invented, and apply them to business problems. We also had a large cash flow and a good borrowing base because the punched card machines were on rental.

## What specific achievement, or achievements, have given you the greatest satisfaction?

THE achievements that have given me the greatest satisfaction run down two roads—one a people road and one a financial road. The financial road is that—no matter how you measure it—this company has been a success. And since I've been a part of the management team of the company since 1947, no matter how low I might feel at some moment or other, I can always fall back on this fact: We *must* have been doing something right. The other road, the people road, is that we've built a lot of jobs for a lot of people. Now, some of those jobs aren't as interesting as we'd like them to be, but there are many people working to make them better. I know that this is one of Frank Cary's fundamental interests. I look at the people who were immediately around me, who really worked hard, and I find that many of them are at the top of the business today. And even in the less-demanding jobs, we have been able to provide security, continuity, and employment—and this is something that many other companies haven't been able to do.

## What do you think makes IBM different from other successful businesses?

THE quality of our people. When my father left the National Cash Register Company, it had unusually talented and competent people. At least a couple of dozen people who worked for NCR between 1900 and 1920 ended up as heads of large American enterprises. Dad decided, in IBM, that the thing that was going to make it a really great corporation was the quality of the people.

## What were some of your biggest frustrations when you were running the company?

THE time it took to accomplish something after all of us decided it was going to be done. Patience was never one of my great virtues. I learned a lot from Frank Cary in that regard. Frank was in charge of the System/360, and it was a very complicated machine. He refused to panic. He said, "I will tell you about the deliveries. I will tell you about the manufacturing. I will tell you about a lot of other things that have to be decided, but it will take me eight months." It all worked out, but the waiting was terribly frustrating.

## What were some of the key decisions that led to the World Trade Corporation's success?

WELL, this has a lot to do with my father and my brother, Dick, and very little to do with me. In the beginning, I had nothing but problems with the international business. At the end of the war I found that overseas people were underpaid, and that we had a relatively small department here in New York that was controlling the foreign business. The fellow who was at the head of it didn't sit sufficiently high in the councils of the company. But my father had the belief that one day that world market would be terrific. And I think if he looked at the record today and found IBM World Trade is making more than the U.S. company, he would not be at all surprised. But I can remember in the late Forties going to him—the total foreign situation was well in the red—and saying, "Look, why not let this thing cook over there? Why keep pushing the money into building those plants or sending those machines over?" But he believed in World Trade, and it finally paid off. I think that the job Dick did was really a spectacular one.

## Do you think a business career is still attractive to young people?

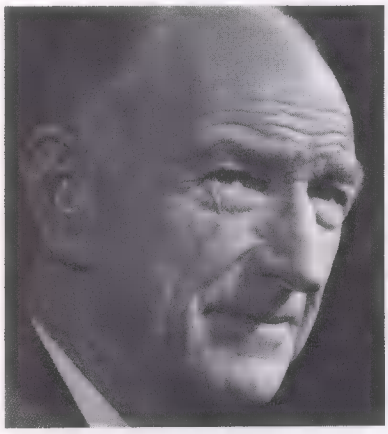
YES, I do. Many kids today are fairly disillusioned. But many aren't. I think you almost have to wait until the kid who has had everything during high school and college gets sorted out. That youngster can philosophize, and say, "Oh, my father had ulcers. He was never home with my mother. We had to move eight or ten times and that's the last thing I want to do." But I have the feeling that if this same youngster goes to Vermont, seeks the quiet life, and begins to make, say, horseshoes, well, after two or three years he may find the pace of that existence dragging. And maybe, he realizes, it isn't so bad heading a department in a big company where one has to make decisions and be responsible for people under him who have problems. I have a daughter, who had very liberal views. Today she's hard at work in a hospital counseling old people. And the fact that these old people look to her for leadership, for spiritual guidance, is very important to her. So I'm not sure that seeking the placid life is anything more than kind of a phase, although I'm not really arguing against it.

## Suppose a young man or woman came to you and said, 'I'm thinking about joining IBM. What do you think?' What would you say?

I'D tell them there are two ways to go. They could join IBM and if they had talent, they would probably find their way up through the business to a good job. If they were *really* good, they might end up close to or at the top. The other way to go would be to join some up-and-coming young company, help make it go, and rise with it. They'd get a lot more stability in IBM than with the little company. On the other hand, they'd probably have more of a chance to become a millionaire with the small entrepreneurial company.

# Well remembered

These four men, says Watson, taught him a good deal about business. Here's what he had to say about them at his retirement dinner in late November.



**L. H. LaMotte**

*"Red LaMotte was in charge of the Washington office for a long time, and he created a happy, dedicated team. There was no one in the company who was more approachable or better liked. Red taught me a lot about morale building, and he helped me understand how to get more enjoyment out of my business life."*

**T. Vincent Learson**

*"From Vin Learson, I learned that if you really tried hard enough you could accomplish almost anything. Vin got those first computers of ours working and in the customers' offices. Most important of all, this meant that the customers began to pay the bills so that we were able to build others."*

**Arthur K. Watson**

*"One day my father said, 'World Trade will be a bigger operation than the U. S.' I just couldn't believe it. But today it happens to be making more profit than the U.S. company and it is growing ahead of the corporation. I owe my brother, Dick, thanks for many things—but particularly for the income that World Trade produces."*

**A. L. Williams**

*"I've had a wonderful relationship with Al Williams. Outside my own family, I've gotten more good advice, friendship, backing, and assistance from him than any other individual in the world. I don't think the* IBM *Company would be nearly the company it is today without the contributions of Al Williams."*

One comment about IBM is that employees must conform to certain strict standards. How do you feel about that?

A lot of young people get the idea that if they go into something small, they won't have to conform. I doubt it. Frankly, I hated the conforming in IBM in the Thirties. I hated to have to get in at 8:30. I hated to wear a stiff collar. I hated to smile at my manager. I hated to have my desk clean at night. And I was glad to get out of it and into the Air Corps where I wouldn't have to do any of that stuff. But non-conformity didn't work there, either. I remained a second lieutenant in the Air Corps for an all-time record period. And one night I sat in my tent in Fort McClellan, Alabama, and I thought, "What is the matter with me? Something has got to be wrong." And I suddenly said, "All right, in addition to your flying skills, you have to be able to be a leader." I had the supply section of this outfit, and I had to make those guys respect me and work for me. I had to make the adjutant respond and the chief sergeant move and the head of the outfit know who I was. And I couldn't do it by operating by my own rules. Suddenly I began to move up, and I was a lieutenant colonel before I left the service. And I decided, "All right, that teaches me an important lesson. You just can't go your own way in any walk of life, whether you're a busboy in a restaurant or the chairman of the board of a corporation. You can't stick your elbows into people." This applies as much to the youngster who goes into a little business of his own as it does to the youngster who enters the IBM Company.

## System/360 has been described as an example of IBM's willingness to 'shoot for the moon.' How do you encourage people to reach out, to really be bold?

WELL, as I've said before, it always helps if you have the resources. And this stems from a basic decision by Al Williams and myself to pump more of the company's earnings back into research and development. Also, I've always been a great believer in not betting everything on one person or one laboratory. Competition is healthy within a company. I couldn't begin to tell you how much money we've made because of the way Endicott and Poughkeepsie competed against each other. If they had made rifles, they'd have been shooting at each other across the Hudson. I never thought of myself as a strong, intellectual manager, and I wanted a company with as much built-in automatic policing and direction as possible. One of the ways to achieve this is with competing facilities. I think you can see a good example of this now in the competition among our various laboratories—not only in the United States but abroad. They're all struggling to get their share of the R&D dollars so that they can produce some of the results of the kind we're all looking for.

## How do you feel about the emphasis on perfection that seems to be so prevalent in IBM?

THE emphasis on perfection, I think, has been misconstrued somewhat within IBM. Perfection is an ideal—something to be sought, but obviously rarely achieved. At the top of the business, the drive is for progress, to move ahead. And you can't wait for everything to be perfect before you make a decision because you'd be waiting forever. What we want is to move ahead, to know that the men and women in IBM will go the extra mile or two more often than the people of any other organization.

## Over the years, would you say IBM has shown an unusual ability to reorganize itself?

YES. And I can remember that first reorganization at Williamsburg. It was about five months after my father's death. I came home from Williamsburg and I was nervous about what had been done. I remember that night as vividly as if it were last night. I went to dinner at somebody's house, and I was so worried that I had a bad evening. Well, the reorganization worked reasonably well. And we've been able to reorganize successfully since then. I remembered some advice my father had been given about change by his boss at the National Cash Register Company. "Change is good," he was told. And it does seem to keep people from getting in a rut. And it got so that if anybody wanted to reorganize and it sounded logical enough, my reaction was, "Well, God bless 'em." The very reorganization would be a revitalizing sort of quality. A company that won't change won't stay among the leaders for too long.

## Isn't it sometimes difficult to communicate 'reality' to the top of the business—that is, get the plain unvarnished facts to the people responsible for running the company?

YES, it is. And that's partly a result of our interrelated product line, which means that we can't have a lot of separate companies operating completely independently. That kind of an organization might well result in decisions that had been filtered less by the time that they reached the top. Because we're the way we are, I think that anybody who operates in IBM has to have an intuitive feel for what's right and what isn't. It's a feel that goes beyond known facts. It's what a person's instincts tell him.

## Can you give an example of an instinctive reaction in decision-making?

WE did a lot of building in IBM about ten years ago, and some of the building prices were pretty good. But I had a presentation for a warehouse for somewhere around $12 a square foot, and my instincts said that this was wrong. So I said, "We're just not going to pay that for warehouses. What does it cost to build a supermarket? A lot less than that. Well, this isn't even a supermarket. It doesn't even have to be as good as a supermarket because you won't have the public in there." My executive assistant said, "My dad just built a grocery store down in Tennessee." So I said, "Let's get those costs." Well, they were way, way down. This instinctive decision led to some facts, and the facts supported the decison. Then we could say that we weren't going to pay any more than $8 a square foot for warehouse space.

## Some people seem to have the idea that IBM is a company run by committees. Do you think they're right?

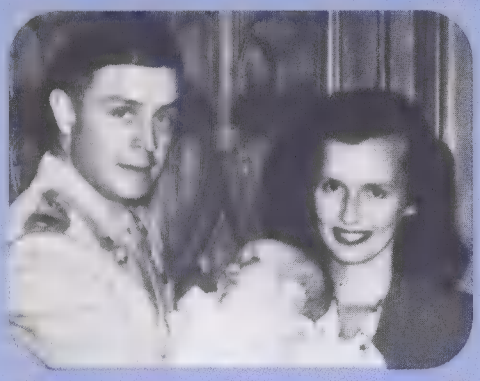
NOT at all. It's been a company of entrepreneurs. What committees do is help pull us together. We tell one another what we know and what our views are so that we all get a better across-the-board picture of the business. Of course, what committees like the Management Review and the Management Committees [now replaced by the Corporate Management Committee] also do is to set apart some names so that people in the company know where the authority is and whom they may have to convince. And committees mean that people get asked to make presentations before them. This can be painful—particularly if you're the one making the presentation—but the benefit is that people must formally detail exactly what they want to do.

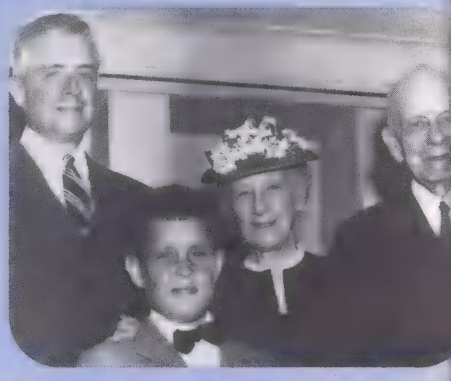
## From a very personal point of view, what would you have done differently in your business career if you had the chance?

I think that if I had known what I was going to have to cope with after school, I would have taken different kinds of subjects in college. I would have taken an advanced degree. I would have studied a great deal harder. There's a paradox here, though. I've always been interested in the fact that many extremely intelligent people have difficulty making clean decisions. A person of medium intelligence often can make better decisions than extremely bright people. Why? The reason is that the very bright person has such a breadth of wisdom that he finds many arguments on both sides of a question. And he tears himself to pieces but doesn't make a decision. I had a motto when I came to IBM. I said the only thing that aging helps is whiskey, that any postponed decision is going to hurt the progress of the company. I'd rather have it quicker and wrong. A wrong decision pretty much boils up very quickly after it's made. You say, "My gosh, we were wrong." Then you change and do it right. But to throw the switch and make the decision, that's what's important. There are some advantages to just having a hunch.

## As you leave the day-to-day business of IBM, do you feel you have left anything unfinished?

I am unhappy with the fact that we have not been able to refine the selection system to a greater degree, and make fewer mistakes. My concern is not *commission*, but *omission*. I think there are plenty of very able people whom we do not spot in IBM, and that we fiddle along with mediocrity too long in jobs that require superiority. We don't concentrate on the fact that this man or that woman is simply blocking some other person —young or old—who is more able. I suppose that's my greatest regret—failures in the selection process. I don't have any regrets about the progress of the business. There's a lot of talk about antitrust. We have a lot of suits against us. But as far as thinking that we did anything wrong to hurt anybody, I don't believe we ever did.





# Profile

## The man behind the title

Not long ago a member of Thomas J. Watson, Jr.'s staff, accompanied by his wife, visited the former chairman of the board at his home in Maine. The assistant's wife was intrigued by the history of a local peninsula, and Watson, hearing of this, said he had an interesting book on the subject. "Please take it with you," he added. "But I'll have to have it back. It's the only copy I have." The couple returned to their home in Connecticut, and a few weeks later the wife received a handwritten note from Watson. It said that he had located another copy of the book and would she please keep hers and enjoy it.

A minor incident. But it illustrates some paramount facets of the Watson personality—his interest in and sensitivity to people, and his supremely well-organized approach to all matters, an approach that rarely overlooks any item, big or small, and makes every minute count.

The list of Watson's nonbusiness interests and achievements is extraordinary by any measure, even more so when you consider his consuming involvement with IBM over the years.

"Tom has always had a tremendous inner drive to excel in everything he does," says a longtime friend. "It's a manifestation of his lifelong pursuit of excellence, a quality that's deep in his makeup."

This drive for excellence is one of the heritages from his father, Thomas J. Watson, Sr., who took command of the Computing-Tabulating-Recording Company (which ultimately became IBM) in 1914. It was in that year also that Tom, Jr., was born.

Tom Watson, Jr., refers to his father frequently, not only, apparently, because of their great common interest in building a business, but because of the profound influence the older man had on his son.

"Father never forgot his humble origins," says Tom Watson, "and he could go to a plant or an office and talk to the people there and really know how they felt and what they wanted most. He had the common touch, and this is the big reason why, over the years, IBM has been among the leaders in benefits. My father was very sensitive to the needs of the average person who worked for IBM. I don't think I'm as good at it as he was, but I've always tried to remember that the people in the business are the most important part of every consideration."

It is this interest in people, perhaps, which has caused Thomas J. Watson, Jr., to gain a well-deserved reputation as a person willing to speak out—as a private individual—on major issues of the day. He has stood up for a number of causes—ending U.S. involvement in Vietnam, internationalism, better national health programs, more efficient use of America's retired people (with more dignity and usefulness for them), providing some sort of guaranteed Federal aid to people whose incomes are below a certain level.

In 1966, defending the last point, he told an audience in Chicago: "Many of my friends tell me that a dole of any sort saps the initiative, and I do not disagree. But how much initiative is there left to sap from a coal miner in Appalachia whose mine is closed and who actively has sought work for a decade? . . . It would be simple to say that all the unemployed are shiftless, lazy, and undeserving. But it just isn't so."

In 1968, addressing the topic of the computer's potential threat to privacy, he warned against the glorification of machines. This sort of attitude, he said, could "fold, spindle, and mutilate the human being."

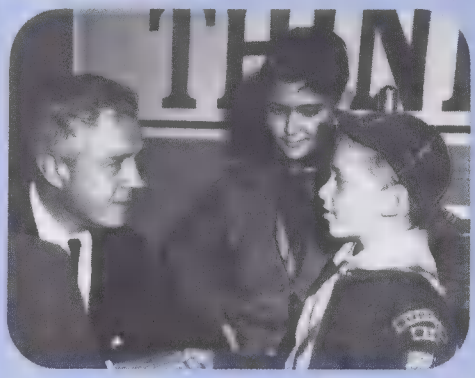
While the unremitting pursuit of excellence often makes for a hard road, in Watson's case, it has led to an imposing record of achievements.

He is a talented and experienced pilot, adept at handling prop-driven, jet, single-engine, or multiengine aircraft. And gliders, too. He is a tough, imaginative ocean-going sailor. He is an excellent skier.

"He likes to test himself," says a man who has known Watson for years. "And he is a competitor. Make no mistake about that."

Watson's nonbusiness interests extend far beyond the world of sport. He is an enthusiastic and skilled photographer who likes to talk shop about his equipment, and takes pictures of professional quality.

He is a collector of art, and, for a man as busy as he is, an extremely well-read person. Watson sometimes deprecates his own intellectual depth, pointing out that he was an indifferent student in college and that some of his business decisions were as much the result of hunch and instinct as brainpower. This does not happen to be an



opinion shared by his friends.

Over the years he has given great amounts of his time to civic, educational, charitable, and governmental organizations ranging from President Eisenhower's Commission on National Goals, the Rockefeller Foundation, the Boy Scouts of America (he was president of the National Executive Board), and the National Center for Voluntary Action to the board of trustees of one of his children's schools, and a New York City committee created to improve pedestrian safety.

He is on the board of two other corporations besides IBM, and is a trustee of Brown University, the California Institute of Technology, the American Museum of Natural History, and the Institute for Advanced Study.

Watson is also an ardent collector. Among his specialties: antique cars and scrimshaw, the carved ivory pieces turned out by whalers during their long sailing voyages around the world.

Friends and associates say that Watson is a man with a well-developed sense of humor that reveals itself in everything from joke telling (he is an unabashed stealer of stories that strike his fancy) to an occasional playful prank. Some of the gifts he has thought of for colleagues at birthday and anniversary parties are legendary.

Flying, perhaps, is the activity which appeals to him the most. He spent much of his allowance while a student at Brown on flying lessons, and during his five-year hitch with the Army Air Corps (he was called to active service with the National Guard a year before America entered World War II), he rose from second lieutenant to lieutenant colonel, ferried bombers to Russia, and flew in the China-Burma-India Theater.

It was in the Air Corps, says Watson, that he really learned that a person had to conform to some degree to the rules of the organization he was with. And he credits his service experiences with giving him much needed confidence in his ability to return home and do well in his father's company, something about which he had worried.

Even with all his outside activities and business interests, Watson manages to be a family man. He and Olive Watson, married in 1941 just 8 days after Pearl Harbor, have a son and five daughters. While business has kept him away from home much more than he would like, Watson has done his best to be with his children, occasionally traveling great distances for as simple a pleasure as keeping a sailing date with one of his daughters. He has four grandchildren now, and already the older ones go sailing and skiing with their tall, white-haired grandfather.

His health has improved steadily since his heart attack in late 1970, and, while careful to pace himself, Watson still leads a busy and varied life. He skis and flies with as much gusto as ever, and is planning a number of what he calls "fun projects," including an expedition this summer to Greenland.

How does Watson, the sportsman, man of public issues and government service, and family man, differ from Watson, the corporate executive? A close friend and business associate answers this way: "You really can't tell where one ends and the other begins. Watson is Watson on and off the job.

"He tries for excellence in the personal things he does. And he wants everything about IBM to be excellent, too—and that includes the people, products, buildings, everything. It doesn't matter if it's something as small as chipped paint in an IBM elevator or the biggest computer we're going to make. He's involved. He's concerned."

Other qualities characteristic of IBM's second chairman of the board, according to those who know him well:

"A sense of doing what's right that's instinctive—just like his father's."

"He never fails to think of the people impact of everything he does."

"He has style. He isn't a technical man, but he has the imagination to see things that need doing. And he has great faith in the people of IBM."

What about that Watson temper that one hears about in IBM? Well, it exists, but those who know the man well say it's a more-or-less natural product of his drive and his impatience with careless or incomplete work.

How much will IBM be changed without Tom Watson, Jr., present on a full-time basis?

"I don't think IBM will lose its basic beliefs or anything like that," says a Watson associate of many years. "We have a great tradition to carry on and a management team that will continue to do an outstanding job. But it won't be the same company without Tom Watson. It couldn't be." ■

# MANAGEMENT BRIEFINGS

## REVISITED

They were started by Tom Watson Jr., and for many years they reflected his uniquely personal views on the business. Time has not dimmed them; most are as applicable today as when they were written.

**Relations with vendors**

"Here's a reminder on accepting Christmas gifts from vendors: don't."
*December 8, 1959*

**Smugness**

"One of our salesmen was ushered into a company president's office one morning not long ago. It was his first day on quota. He was full of confidence. As he shot out his hand, he announced, with all the conviction he could muster, 'I'm from IBM.' Apparently, he had mustered a little too much conviction. The president, not at all impressed by this remarkable disclosure, replied blandly, 'What do you want, a medal?' "
*February 2, 1960*

**Good will**

"The only way we can be sure of keeping . . . good will is always to consider the total impact of our personal and collective behavior. The little things we do—or fail to do—often testify louder than the loudest statements of our intentions. It is easy to be big in big things, in big moments, when everyone is watching. Real character emerges in the way we meet our routine, everyday obligations."
*March 16, 1961*

**Complacency**

"We have not grown so big, and we are not so successful, that we no longer need the help of others. Nor are we so securely on top that we can all lean back in our chairs and lull ourselves into thinking IBM will go on forever, whatever we, as individuals do or don't do."
*March 27, 1961*

**Healthy skepticism**

"We can get so bogged down in details that we miss the whole point of what we are trying to get done. What I am urging is that we all apply a healthy skepticism, a creative dissatisfaction, at all times, to whatever we are given to do.

"We should never tolerate meaningless tasks, or taboos, or an inefficient method simply because it's always been done that way, or because we've been told it's the 'IBM way.' The 'IBM way,' as far as I'm concerned, is whatever way is most efficient, no matter how it was done in the past."
*June 14, 1962*

**Gobbledygook**

"A foreign language has been creeping into many of the presentations I hear and the memos I read. It adds nothing to a message but noise, and I want your help in stamping it out. It's called gobbledygook.

"There's no shortage of examples. Nothing seems to get finished anymore—it gets 'finalized.' Things don't happen at the same time but 'coincident with this action.' Believe it or not, people will talk about taking a 'commitment position' and then because of the 'volatility of schedule changes' they will 'decommit' so that our 'posture vis-à-vis some data base that needs a sizing will be able to enhance competitive positions.'

"That's gobbledygook." *February 19, 1970*

In the late 1950s, IBM stood poised on the brink of what promised to be (and was) a period of spectacular growth and performance. But there was one aspect of this otherwise appealing business prospect that bothered Thomas J. Watson, Jr.

Rapid growth, he realized, would bring with it thousands of new managers—and at a pace which would not allow them sufficient time to absorb IBM's traditions, beliefs, and dedication to the "people" concept. And the right kind of managers, Watson felt, properly trained and properly motivated, were essential to IBM's continued success.

The potential problem was anticipated by establishing management schools and by inaugurating, in 1958, *Management Briefings,* a series of publications which went directly from Watson to IBM managers everywhere. During the next 13 years (a period in which the large majority of today's IBMers, exclusive of World Trade employees, joined the company), Watson issued almost a hundred of them.

The charter of *Management Briefings,* described by Watson in the first one, was ". . . to provide managers throughout the company with more background information about current IBM announcements and activities and explain to the greatest possible degree the 'why' behind our policies."

Were they successful? An independent survey taken in the mid-1960s resulted in a response that was overwhelmingly positive, and led to this comment: "Seldom in a survey on a communication do you find such a strong favorable response . . ."

Probably nowhere in IBM have there been any other management communications with more bite, directness and, yes, occasional flashes of humor. Following are some excerpts from *Management Briefings* over the years.

**Budgets**

"In IBM we have always tried to appoint as managers ambitious, hardworking men and women who like to get things done. By and large, we have succeeded and the result is a team of people who are building an unparalleled business record. Some managers seem to believe that they can measure their accomplishments by the size of their budgets. Bigness, as the dinosaur discovered, is not necessarily a measure of excellence. So it is with budgets. Obviously, the test of excellence in IBM is how your achievements, not your budgets, grow."
*September 29, 1967*

**Risk-taking**

"Recently an IBMer wrote me about a statement made by a manager at his location: 'I only have five years to go for early retirement, and so I'm not going to rock any boats.'

"I suppose that manager thinks he is protecting himself. Actually, he has only stuck his head in the sand, and this is a most vulnerable position."
*January 12, 1971*

**Relocating**

"The attitude persists in many parts of the company that the only way to get ahead is to move . . . I have seen the unpleasant things that can happen when frequent moves disrupt families, complicate financial plans, and interrupt children's education. And I know this kind of pressure can hurt a man's personal development and effectiveness on the job.

"We could try to solve this problem with excessive rules and restrictions on relocations, but that would take the responsibility for managing people out of your hands—where it rightfully belongs . . . Our guiding principle must be that we will make only those relocations that are essential to a person's career growth and the health of the business."
*May 24, 1968*

**Giving credit**

"As we grow, each of us must try even harder to give credit where credit is due—to bend over backwards to give recognition to the efforts of every member of our team. No one will carry a chip on his shoulder if he is invited to take a few well deserved bows."
*March 20, 1959*

**Unreasonable deadlines**

"Most of us have been guilty at one time or another of imposing a deadline ahead of when it was really necessary. The early date provides a cushion against crises, and makes us look good if we can deliver before schedule.

"But we pay a price for such luxuries. If a project goes through the chain of command, with each manager demanding an especially early delivery date, the deadline soon becomes yesterday. The person at the end of the chain is placed in a tough spot, and the whole project is likely to suffer from a bad start . . . Don't let this happen. Don't put your people on the hot seat just to give yourself a comfortable cushion."
*April 25, 1969*

# Speaking out

Over the years, Tom Watson, Jr., has been standing up, putting himself on the line on public issues. He seldom minces words. He is often ahead of the times.

**On the corporation's role**

"Corporations prosper only to the extent that they satisfy human needs. Profit is only the scoring system. The end is better living for us all."
*Pace College Advisory Council, New York City, 1967*

**On safeguarding information**

"No manufacturer can make a system proof against human corruption. Some human being can somehow get at everything stored in any system, however ingenious. Therefore a heavy responsibility falls four-square upon us—every one of us as citizens—to do this: Help devise new public policies—laws, ethical codes, standards of business practice—to meet this new public problem."
*Commonwealth Club of California, San Francisco, 1968*

**On technological change**

"In some ways, you know, our age resembles Pericles' Golden Age in Athens. The Greeks used slaves to create their leisure, and we use a kind of slave, too—the machine. We enslave metal and glass and plastic, while the Greek enslaved his enemy. However, our slaves are not passive . . . They rise to challenge us, their creators. The issue, finally, is whether we can build a society that will exploit them for the good of all of us, or whether we must warp our own lives in accommodating to technological change."
*Brown University, Providence, 1965*

**On man and the machine**

"The greatest bar to wise action and the greatest source of fear is ignorance. A tiny candle gives misleading light and throws huge and ominous shadows. The sun at noon gives great light and throws no shadows. It is time to get this whole problem of men and machines under a blazing noonday beam."
*The American Bankers Assn., San Francisco, 1965*

**On corporate behavior**

"The world can no longer put up with the kind of unbridled, unreasoning, unthinking advance that characterized Nineteenth-Century industrialists. If corporations do not police themselves—in such things as preserving the ecology, telling the truth in advertising, considering the impact on people of new technological devices that they produce—government will be forced to do this policing for them. And it should."
*University of California, Berkeley, 1973*

**On automation**

"In the years ahead of us we've got to figure out some way to bring the power of the new machines into the fight—to wheel the arts of automation into the front line of the battle against ignorance and scarcity and poverty and disease around the world."
*National Conference of Editorial Writers, Milwaukee, 1965*

**On health care for Americans**

"The evidence overwhelmingly indicates that we are falling down on the job, heading in the wrong direction, and becoming as a nation a massive medical disgrace . . . I believe we have only one choice . . . some very new form of national health insurance."
*Mayo Clinic, Rochester, Minn., 1970*

**On taking a stand**

"If you stand up and are counted, from time to time you may get yourself knocked down. But remember this: A man flattened by an opponent can get up again. A man flattened by conformity stays down for good."
*Lafayette College, Easton, Pa., 1964*

# A look at the business

## Frank Cary takes to the road to 'see for myself what's going on.' First stops this year: Endicott and Kingston.

*At the Endicott plant, Chairman Frank Cary talks with second-shift* IBMers *late one evening: Dwight Reynolds, left, a milling machine operator trainee, and Joe Kuzma, an inspection specialist in the machine process quality assurance department.*

ENDICOTT evokes much of the lore of IBM: In the Twenties, a tiny plant in Endicott turned out time-recording equipment . . . During the Forties, the company's top salesmen met in "Tent City" for conventions under pitched tents . . . And, even today, many would-be salesmen get their first taste of marketing during training classes there.

Since 1906, when International Time Recording Company (a forerunner of IBM) built its first plant a mile from the meandering Susquehanna River, Endicott has burgeoned into a major IBM site with 9,000 people, representing seven divisions. Most of them develop and build data processing equipment and programs, including System/370 Model 145, circuit packages for the entire 370 line, printers, other peripheral equipment, and the latest programming operating systems.

Frank T. Cary, IBM chairman and an Endicott alumnus (sales trainee, Class of '49), visited the snow-covered site recently to ask questions and answer others.

"It is always a great pleasure for me to get out of the ivory tower and see for myself what's going on," said Cary during a breakfast meeting with managers.

The questions he was asked were plain and tough—on the energy crisis, litigation, and the company's prospects for 1974. Late one night, Cary visited the plant floor, talked with machine operators, quality assurance inspectors, first-line managers, and other IBMers on second shift.

Over the public address system, he told them: "You started the year with everyone yelling for circuit cards and boards, and everybody worrying about the big back-order positions, and behind-schedule positions. You put on a drive that turned the situation around in a most dramatic fashion. I know the commitment that required, and the overtime hours, and you can all take great pride in the achievement . . . Your work with System/370 Model 145 was outstanding, and your work with the new reader/sorter is important to our long-range future."

The next afternoon, Cary drove several miles from the plant to the Endicott laboratory, where he lunched with managers and toured the facility. Among the lab's recent achievements are five new versions of the Model 145; os/vs1, a new programming operating system; the 3890 reader/sorter; and important advances in industry terminal and printer technology. As Cary put it: "More than any other group, you have your eye on the future. The industry systems you are working on will help usher in a new era of broadened computer applications . . ."

A week later, and 100 miles to the southeast, Cary helped mark 1974 as the 20th anniversary of groundbreaking for the Kingston facility. He praised the 5,400 IBM people there for record shipments of Model 168s, Model 135s, and IBM 3270 display terminals. He also applauded the Kingston lab for developing the new 3600 finance communication system and the 3790 data entry system.

Cary expressed his gratitude for Kingston's cooperation in helping to pull together the Mid-Hudson Valley manufacturing facilities. "I realize the integration has brought some changes, some dislocations," he said. "But it has helped enormously in eliminating duplication of effort and in keeping costs down. Even more important, integration is providing us with the flexibility necessary to undertake a sound program to balance skills, workloads, and space . . .

"Our future," he continued, "will not be decided in court, but by what IBMers do in plants, labs, and customer offices. We are where we are today because our people had an ability to swing with the changes in the world and make the most of our opportunities. And clearly, Kingston has done its part." ■

# Now, it's 'relevant' math

# With its new Mathematics Learning System, SRA is stirring up an old subject.

**by Richard Bode**

If you went to elementary school more than 20 years ago, you may remember your first-grade teacher saying something like this: "How much is six plus three?—and don't use your fingers!"

Teachers wanted you to learn by rote. Your goal was to memorize answers and spout sums and products. And, despite the fact that the drill and practice method of teaching math had its critics, most educators were agreed on one point: You *did* learn how to add.

In the mid-1950s, however, the drill and practice method came under sharp attack. Mathematicians complained that students had little insight into how numbers really worked. The unexpected Russian launching of Sputnik in October 1957 gave credence to their case. The nation, they said, was raising a generation of "mathematical illiterates." As a result, America was falling behind in the space race, they claimed.

During the next few years, textbooks emerged that emphasized the so-called "new math." No more drill, no more rote. But plenty of theory. Children came home from school mumbling something about the "commutative property of multiplication and addition." And a generation of parents, who had arithmetic tables drummed into their skulls, stormed the schools. Teachers, they protested, were filling their kids' heads with bizarre abstractions when they still didn't know how to subtract.

"It was a traumatic period for parents, pupils, and especially teachers, many of whom were as confused as their students," says Richard A. Giesen, president of Science Research Associates, Inc., (SRA), a subsidiary of IBM and an educational publisher. "But it was a necessary break with the past, and a lot of good came out of it."

But Giesen affirms that, like most reactions, the new math may have gone too far the other way. "What we want to do now," he says, "is restore the balance, to teach both skills and concepts. We're no longer talking about new math or old math, but relevant math that allows the pupil to relate numbers to the world he knows."

It's not new math and it's not old math, but 'relevant math' that allows children to relate numbers to the world they know. This is how Richard A. Giesen, president of Science Research Associates, Inc., an IBM subsidiary specializing in teaching materials and textbooks, describes SRA's latest product, which went on the market January 1. It's a new learning system that fills the void between the old-fashioned drill method of teaching and the esoteric 'new math' approach to learning an old subject.

The relevance to which Giesen refers is perhaps the most essential element in the new SRA Mathematics Learning System, which teaches math to all students at all levels of ability from pre-primary (kindergarten) through eighth grade. SRA started to market its Mathematics Learning System to schools throughout the United States and Canada on January 1, 1974—after four years of field tests.

As its name suggests, SRA's new product embraces a number of component parts. The system has as its core a series of nine colorfully illustrated texts (one for each grade; some texts are also consumable) that subtly lure the child into the realm of numbers and shapes. Each page, carefully planned for graphics and content, presents one major idea at a time. Studied in sequence, the text seems to flow like a well-plotted tale.

Page 3 of the second-grade text, for example, begins by reviewing the number line in this way: "Sam's family went for a sightseeing walk in the city. How many blocks did they walk?" The pupil proceeds with Sam and his family along eight blocks, past skyscrapers, derricks, and traffic lights as he fills in the blank boxes on the number line.

By page 52, the pupil is being introduced to symbols. "Our world is full of symbols," the text says, and it shows a red, yellow, and green traffic light on stop, caution, and go. "Mathematics has symbols, too," the text continues, and it presents the symbols for *equal to, greater than, less than.*

By page 81, the pupil is practicing place value with three-digit numbers. He learns that the number 1 in the hundreds column really means 100, and the number 3 in the tens column really means 30. The stage is set for adding and subtracting multiples of ten.

By page 201, the pupil is ready to cope with a mathematical operation which adults usually perform perfunctorily without understanding why they do what they do: borrowing in subtraction. The pupil is asked to subtract 9 from 36. The text shows 36 items. Thirty are in the tens column (three egg trays each filled with ten candies) and 6 are in the ones column. Obviously, he can't subtract the 9 from the 6.

"You need more ones," the text explains. "Dump a ten-tray." So the pupil mentally (and possibly physically) dumps 10 candies from one tray. Now he sees he has 20 items in the 2 ten trays and 16 loose ones. Now he can take away 9 from 16.

Frogs, marbles, pogo sticks, candies, cookies, stars, balloons—those are just some of the things that decorate the pages of the books. The pupil is encouraged to count the flowers on a page—or even use his own fingers—if it helps. "We want the child to relate numbers to real objects," says JoAnn Timmer, manager of elementary mathematics and editor of the program.

**Mathematica:** *Some of the new educational materials used by teachers and students in* SRA*'s new Mathematics Learning System.*

*One of the advantages of the Mathematics Learning System is that it builds a child's confidence in himself.*

"Too often, 'new math' was not related to the child's world. It treated every child as an incipient mathematician. In the new system we begin with the concrete and let the pupil grasp abstractions as his skills grow."

One of the main advantages of MLS is that it builds a child's confidence in himself. "In a typical math curriculum," Mrs. Timmer says, "the fifth-grade child who hasn't yet mastered division may be kept back—even though he may be proficient at addition, subtraction, and mutiplication. Such a drastic step often destroys the pupil's image of himself, and he might never catch up again." A child in the SRA program, Mrs. Timmer points out, would remain on the fifth-grade level and obtain extra help in division. Meanwhile, he would continue with the rest of fifth-grade math: geometry, fractions, and measurement. "A pupil can grasp all these topics without having mastered division," she says.

One feature of the new series is that it treats the customary and the metric system independently. Children are not asked to convert from one to the other, but they are exposed to both and prepared for a metric world. But perhaps the most striking aspect of the text lies in the diversity of the people it depicts. "In our testing, we deliberately selected individuals from all socio-economic groups, races, and ethnic backgrounds," Mrs. Timmer says, "not only to give a sense of reality, but also to show that math is for everyone."

As the pupil proceeds, progress tests in the text measure his mastery of skills and concepts. Does the student know what to do? Why? How? If the pupil needs extra help, he may review a chapter in the text, or else work with supplementary materials which are part of the learning system. By the time students have completed all nine texts, they will have passed from number recognition to transformational geometry.

Besides basal texts, the math system includes teachers' guides that explain how to use the textbook and suggest supplementary activities to reinforce and extend skills and concepts; resource boxes to assist with individualizing instruction; and practice materials of various kinds.

The textbooks are the creative product of four authors (plus scores of consultants and editors), each with a different sphere of competency. Dr. M. Vere DeVault is a professor of curriculum and instruction at the University of Wisconsin. Dr. Herbert J. Greenberg, formerly director of mathematical sciences at IBM's Thomas J. Watson Research Center, is professor and chairman of the department of mathematics at the University of Denver. Fr. Stanley J. Bezuszka, S.J., is di-

*Left: First-grade teacher Mrs. Elaine Beaghan and her pupils play an* SRA-*developed game that teaches basic skills in arithmetic.*

*Checking drill pages from* SRA*'s Mathematics Learning System are these youngsters from the Lakeview School in Chicago. The new product is designed to teach math to students from kindergarten through the eighth grade.*

rector of the Mathematics Institute at Boston College. And Helen Frehmeyer has years of experience as a master teacher and a trainer of teachers.

"The texts," says Dr. DeVault, "are really the result of a team approach among authors and editors with considerable role-changing along the way." As for the program itself, Dr. DeVault cites three main attributes. "First," he says, "the language is informal. Second, the format is attractive. And third, it is built on the system concept. It can be adapted to the different needs of different teachers."

Dr. DeVault's sentiments are echoed by Leo Anglin, a former elementary teacher from Elkhart, Ind., who taught the materials during the field-testing stage. "There are many ways for a teacher to manage a class," Anglin says. "Some like to work with the whole class at once. Some are involved in a team teaching situation. Others prefer to individualize instruction by dividing the class into groups. In that kind of situation, one group of pupils may be learning arithmetic facts, another group may be focusing on advanced problems, and a third group—which has mastered both facts and problems—may be turning to new material. This system fits all these approaches and others as well."

One teacher who has been working closely with the new program series in the classroom is Mrs. Elaine Beaghan, a first-grade teacher in Hoffman Estates, a Chicago suburb. Mrs. Beaghan is now in her second year of teaching the math program. Last June, her pupils took a standardized test to measure their mathematical proficiency. Their test scores indicated they had attained a level of competence equal to that of second-grade students in the fourth month of the school year. "This is well beyond the norm," she says. "I think it's largely due to the fact that the text doesn't jump around from one idea to another. It stays with an idea and develops it." Mrs. Beaghan thinks so much of the new text that she took a copy home for her seven-year-old son, who attends another school.

Mrs. Beaghan is one of almost 700 teachers in 85 school districts in 35 states and four Canadian provinces who participated in a field verification study conducted by SRA before bringing its educational product to the marketplace. Participating teachers had a "hot line" to SRA's offices in Chicago. When they found something in the text that confused or misled their pupils, they phoned in their criticism, and the text was revised accordingly.

"It's the long, hard, and expensive way to prepare a basal series," says Archie E. LaPointe, SRA vice president of development, "and to the best of my knowledge we are the first commercial mathematics publisher to conduct a field test of this magnitude. This means that when a school adopts the Mathematics Learning System, the bugs will have been worked out. More than 20,000 pupils have learned from it. Standardized tests taken by approximately 11,000 of those pupils show that they have mastered more math skills and concepts than would be normally expected for their age and grade."

Further proof lies in how the students themselves feel. Here are a few of their comments, culled from unsigned questionnaires: "I think this math is very good," one wrote, "because I know what I am doing and it sure teaches me a lot of what I want to know."

"Even our teacher says she's learning something," another pupil wrote.

Still another said: "I liked the program and nothing was hard or difficult. I think the book should come out to the world." ■

*Educated in the old math, freelance writer Richard Bode—who specializes in articles on business and technology—says he and his wife have struggled with the new math while raising four children.*

# Coping with SHOR

by Robert J. Siegel

*Running out of everything*—that's how one national newsweekly put it in a cover story on shortages, the latest of the economic afflictions to beset the U.S. of the 1970s.

For the most part, consumers have yet to feel the brunt. Except, of course, in home heating oil, and in gasoline where the shortages have shortened tempers in long waiting lines. But delivery times on a great many products are being stretched and manufacturers foresee exasperating scarcities ahead on some retail shelves.

Particularly beset by these shortages are the purchasing people of major corporations. Vendors are cutting supplies. Alternative sources are harder to find and there is a continuing search for substitute materials.

How is IBM doing? All right, despite the problems. A big reason is the resourcefulness of hundreds of employees in every area of the business.

Like motorists who search for open gas stations and then wait in lines, American industry is scrambling for critically short commodities—especially fuel, chemicals, plastics, and the specialty steels.

IBM is no exception. And almost daily the "lines" are getting longer while the number of suppliers who are "open" is shrinking.

Corporate purchasing, says Harry Moore, IBM director of manufacturing services, is coordinating a worldwide effort to make certain that IBM's plants and laboratories have enough fuel to keep open, and enough critically needed materials to remain in production.

So far, IBM's purchasing people have a good track record: no major shutdowns, no halted assembly lines, no seriously disappointed customers.

But it has required a full-time, three-pronged effort to keep things moving smoothly in the face of worldwide shortages:

- Stringent conservation of supplies which are available. This includes reuse, stretched-out usage, and multiple use of items, many of which, Moore says, "we once bought cheaply, used, and threw away."
- Substitution of more readily available materials for those in short supply, but only if quality and integrity of the product or part is not affected.
- A new effort to identify potential shortages, and to firm up vendor commitments earlier; also, to ensure that adequate supplies are on hand in locations which must have them to keep on working.

"The whole subject came up in the fall of 1972," explains John W. Brislin, director of purchasing, Corporate staff, "when we began looking into suggestions that there might be an impending oil shortage. Information provided by government and petroleum industry experts convinced us there was trouble over the horizon."

Corporate purchasing immediately asked all IBM locations to survey their existing fuel storage capacity and supplier contracts. Most, it turned out, had been maintaining a 30-day supply of fuel oil through the years. The rest were asked to bring their storage capability up to the 30-day level. This included some locations which found that their "30-day supply" really was less than 30 days, due to factors such as accumulation of sludge in the bottom of storage tanks.

"While nobody anticipated the crisis which grew out of the Middle Eastern conflict," says Brislin, "we took action in time to keep our locations from getting into trouble. Coupled with IBM's energy conservation efforts and the generally mild winter, this has left us in relatively good shape so far as fuel oil goes." *(See page 46.)*

It was when the energy crisis began to affect the supply of basic petroleum "feedstocks" from which, for instance, chemicals and plastics are manufac-

tured, that the purchasing people really moved into high gear.

They began to line up worldwide sources of supply for some 56 chemicals and many other materials identified as critically short. Special steels from Germany were bought for shipment to Lexington. Australian plastics found themselves en route to Raleigh. American steel went to Argentina.

"Although we provided the coordination in Armonk, the purchasing people in IBM turned into a sort of worldwide 'mutual aid society,' " says Brislin.

Simultaneously, the combined production control and purchasing groups initiated a detailed forecast of 1974 requirements for all manufacturing locations. "And we went ahead and made every effort to commit our suppliers to all expected 1974 delivery requirements," Brislin adds. "Most of the suppliers told us this helped them plan ahead better than ever before."

And in the System Development Division, a special group under E. P. (Gene) Damm began to catalogue materials now in short supply. "Our objective," he says, "is to identify those materials for which substitutes can be made at the engineering design level, and also to identify the precise materials which can be substituted. At the same time, of course, we have to be absolutely certain that the quality of any finished part or product is not degraded in any way."

Ultimately, though, the biggest dent into shortages may come about through what Brislin calls "old fashioned making-do-better with what we have."

IBM task forces have put under a microscope (in some cases, literally) all the processes which require hard-to-get chemicals and plastics. And they've come up with some surprising savings.

Thousands of keyboard buttons—letter keys from terminal typewriters, for instance—have been recycled because the styrene plastic from which they are made is extremely hard to obtain. Explains J. B. (Jim) Long, procurement distribution manager in Raleigh: "The first step was when someone in Kingston suggested we salvage the keys off some old terminals. We plan to pull them off, have them ground up, and the result will be a heck of a lot of new keys—all dark grey. But it will free the new plastic stock for keys in other colors."

Long anticipates that reuse of the plastic buttons will grow as the supply of new styrene dwindles.

In Endicott, R. J. (Bob) Winters, heading a special task force for chemical conservation, has come up with extensive savings in chemicals used to manufacture printed circuit boards.

"We've been able to stretch their use measurably," reports Winters. "For instance, we use hydrochloric acid to clean copper for circuit boards. We also use it to clean piping and machinery. The first thing we found was that use of the hydrochloric acid could be extended from two weeks to four weeks without losing efficiency. Then, instead of disposing of it, we hold it in tanks until we need it to clean the pipes and equipment—something we used to do with fresh acid."

The net saving: some 50 gallons of acid a day. It's not a terribly expensive material, but is in very short supply. (And the cost has been rising.)

Another major requirement is for solvents (or chemical cleaners) such as methylethyl ketone. Here, when time-in-use is stretched out, the results aren't quite up to those obtained with fresh solvent—but still are satisfactory. And another commodity which is very tough to get has a longer life in IBM.

And East Fishkill learned, Brislin says, that isopropyl alcohol, which once was so cheap that it was disposed of after a single use, could be reused in Lexington for a completely different industrial process.

Commodity shortages also have led to a housekeeping problem of sorts, Moore points out. Some IBM locations have been forced temporarily to store 55-gallon drums and bags of chemicals in parking lots.

"The drums and bags contain materials we used to get in bulk—tank-car lots, for instance. Now, we sometimes have to make do with smaller shipments, which come in drums. Or, for some materials, we're going to overseas suppliers, who send a shipload of drums, rather than tank cars."

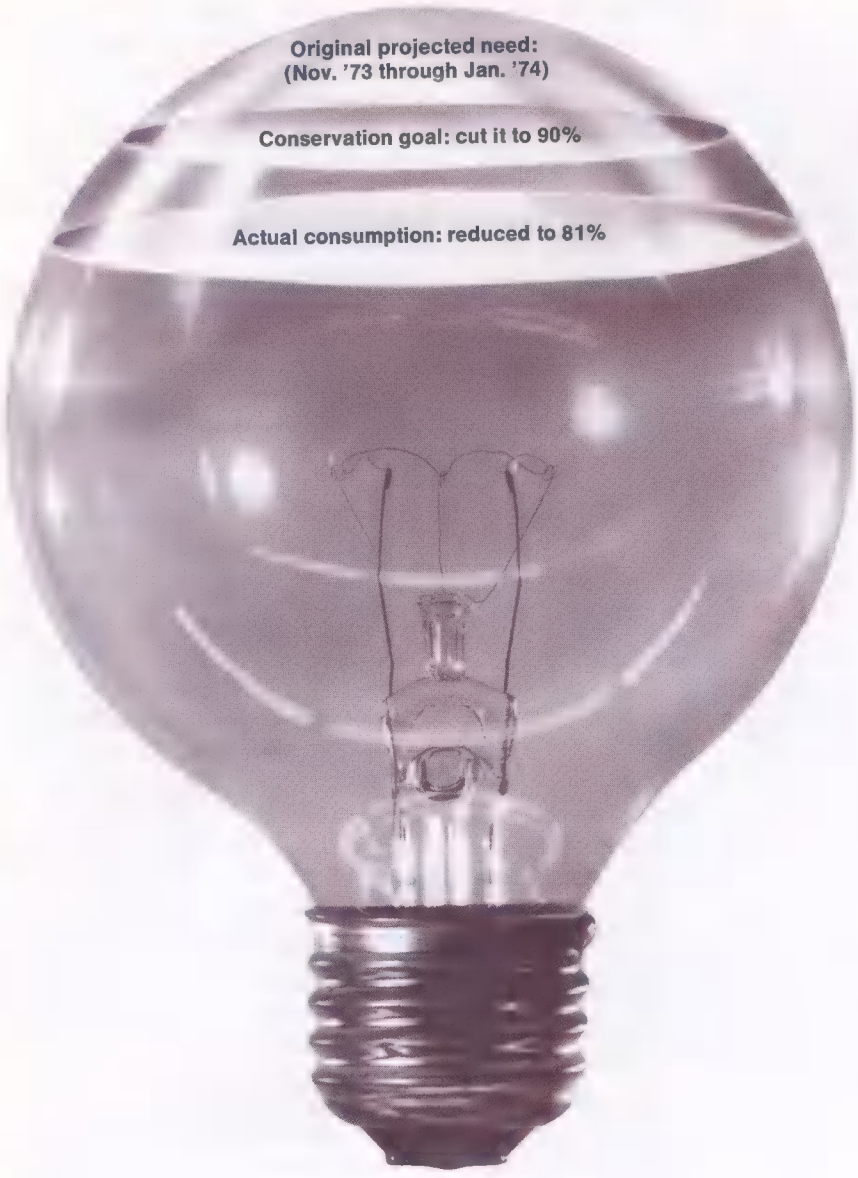
And of course, half the drums often are empties on the way back to the suppliers, Moore adds.

Moore and his people voice cautious optimism for the future. "With the kind of imagination and work that IBMers have demonstrated so far, I'm confident we'll see our way through this period of shortages," says Moore.

But he also concludes: "We're learning a lot, as a company and as individuals, from this period of shortage and crisis.

"For one thing, how to run this business a little more efficiently, and by doing so, how to conserve national resources which never again will be quite as cheap or as readily available."

It all adds up, Moore believes, to a sensible change in IBM's and the nation's life-style. ■




## IBM electric power savings

In its use of electric power, IBM aimed for a 10% reduction. For the first three months of the conservation program, it reduced power consumption by 19% at 33 locations. Those three months' savings released enough power to satisfy the requirements of 10,000 homes for a year.

# On target

In both fuel and power consumption the company is meeting its energy conservation goals. It's individual effort that's making it happen.

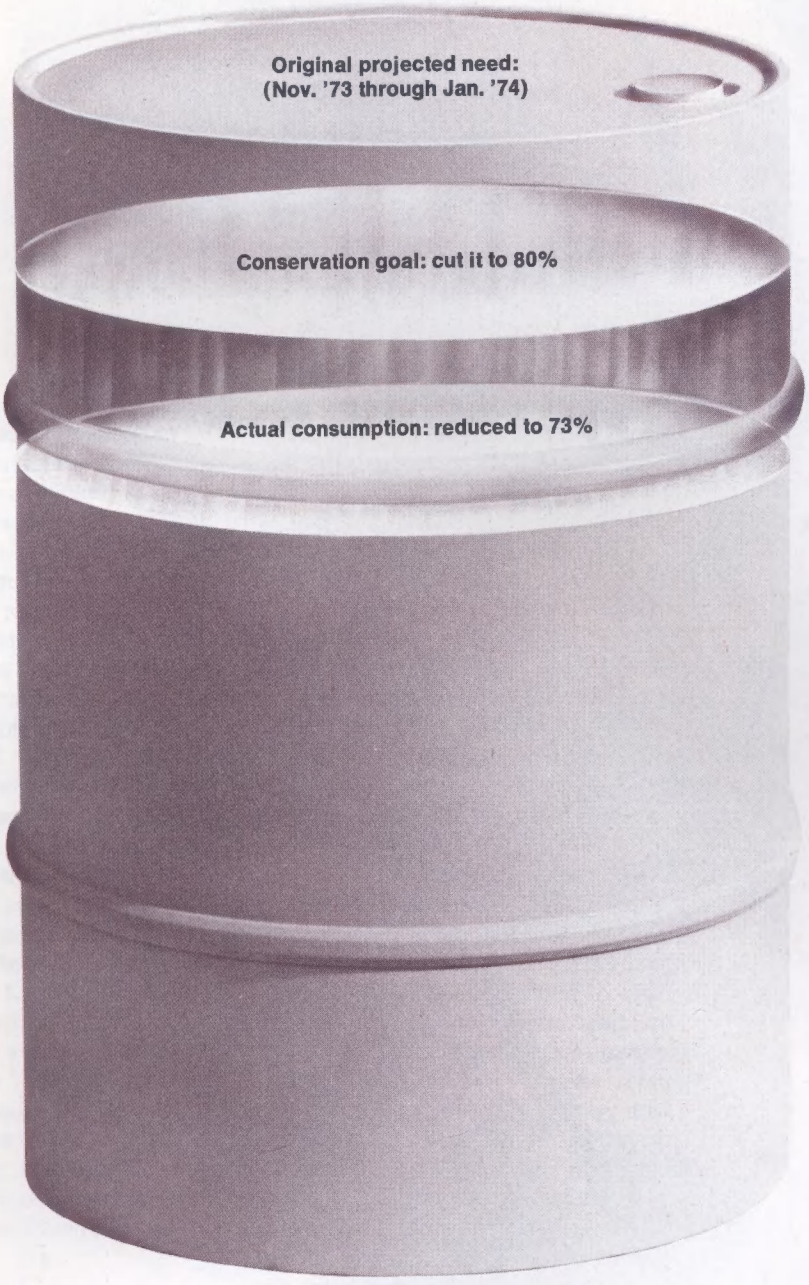
**by Bernard Hodes**

It doesn't seem significant. But every time Nancy Garland leaves her office in Gaithersburg, she flips off the light switch.

"I don't know how much electricity I'm saving," says Mrs. Garland, a suggestion specialist in effectiveness programs for the Federal Systems Center. "But I guess every little bit counts."

Exactly. According to IBM's Corporate Energy Council, similar efforts of thousands of IBMers in many different ways—little and big—are having a measurable impact on the company's energy consumption.

The statistics on gallons of oil and kilowatt hours of electricity saved are impressive, says Joseph Rorick, head of IBM's Energy Council and director of design and engineering with the Real Estate and Construction Division.




## IBM heating fuel savings

For the first three months of its conservation program in heating fuels, IBM sought a reduction of 20% below normal needs. Reports show the company reduced its consumption 27% at 33 locations. These fuel savings are sufficient to heat 4,500 homes in the chilly northeastern U.S. for one full year.

On November 9, IBM placed increased emphasis on energy conservation in all of its U.S. facilities. Energy conservation task forces were set up at all major locations to implement the program. The intensified program's objectives: a savings of 20 percent in fuel and 10 percent in electrical power.

Are they being met? They are. Through January, 33 plant, lab, and headquarters locations with a total of 26 million square feet showed a fuel reduction of 27 percent (25 percent when adjusted for weather) — or roughly 5,200,000 gallons of oil, enough to heat 4,500 homes in the Northeast for a year. (Some locations use natural gas or both natural gas and oil. All fuel figures are given in equivalent gallons of oil.)

Electrical savings are significant, too, and electricity represents approximately 78 percent of IBM's total energy bill. The 19 percent reduction attained in the first three months of the program is the equivalent of about 80,000,000 kilowatt hours, enough power to take care of 10,000 homes for a year.

According to Rorick, these savings don't come from any one facility or location, or from any particular part of the country. They reflect the efforts of employees everywhere. The System Products Division, for example, has saved the equivalent of 2,300,000 gallons of heating fuel; the System Development Division, 574,000 gallons; the Office Products Division, 840,000 gallons; and the General Systems Division, 467,000 gallons. Savings in electrical energy are similarly dispersed and correspond to division sizes.

And it's not only the headquarters locations, plants, and labs that are doing their part. OPD and the Data Processing, Information Records, and Field Engineering Division branches are conserving fuel and electricity, too. Some examples: The Beaumont, Texas, office reports a 17 percent saving in fuel, an 8 percent saving in electricity; at IBM's complex at Penn Center in Philadelphia, fuel savings were 33 percent, electricity savings, 20 percent; the Los Angeles regional offices have saved 45 percent in fuel, 30 percent in electricity.

"These savings come at the right time," says John Honeycomb, manager of energy programs for RECD, and he explains why. "One of our major oil suppliers is furnishing us only three-quarters of what we got in 1973. An-

## Savings in electricity

From Nov. '73 through Jan. '74
for 33 locations

| Division | Percent saved |
|---|---|
| System Products | 18.4 |
| System Development | 20.3 |
| Office Products | 18.8 |
| General Systems | 17.7 |
| General Products | 14.8 |
| Federal Systems | 20.3 |
| Advanced Systems Development | 22.2 |
| Information Records | 22.9 |
| Research | 14.5 |
| Headquarters in Westchester | 26.0 |
| Other | 16.1 |
| **Total** | **18.8** |

## Fuel savings

From Nov. '73 through Jan. '74
for 33 locations

| Division | Percent saved |
|---|---|
| System Products | 22.1 |
| System Development | 39.5 |
| Office Products | 25.6 |
| General Systems | 36.8 |
| General Products | 31.3 |
| Federal Systems | 37.5 |
| Advanced Systems Development | 41.6 |
| Information Records | 36.6 |
| Research | 17.0 |
| Headquarters in Westchester | 37.3 |
| Other | 39.0 |
| **Total** | **26.7** |

other is furnishing us only 80 percent. What has been done in conserving energy has meant that we've been able to get by with these reduced quantities."

What's the outlook for the rest of the year? "Pretty good," says Honeycomb. "Look at it this way. We started the program on the ninth day of November so we didn't have a full month there. And it took a while to get started. Still we did remarkably well. And I think we can do even better in the future."

Honeycomb's enthusiasm is based partly on new conservation efforts that are being devised. His staff makes use of a computer building analysis program, developed with the help of DPD and FSD, that lets RECD know the annual energy consumption for different types of buildings. Such parameters as building orientation and mechanical systems are evaluated to achieve minimum energy requirements consistent with good design. All new IBM facilities are being designed with conservation factors given full consideration.

Expanded use of System/7 in energy conservation is the intent of another application program being developed by GSD under subcontract to RECD for internal use. This program will tie together many of the building automation application programs, and enable an IBM facility to make use of some or all of them with a single System/7.

The program being developed incorporates experience gained on a system that has operated at East Fishkill for over a year. There, a weather station and a sensor network, linked to a System/7, increase the efficiency of heating and air conditioning equipment.

The on-line system resulted in a 6 percent reduction in fuel oil consumption and a 10 percent drop in electricity needed to cool the complex. These savings are only part of the total conservation effort, which now includes reduced heating and lighting.

Called the Computer-Assisted Facility Operation (CAFO), the system does the following: provides real-time visible data on performance of 5 boilers and 10 chillers; generates diagnostic data on a continuous basis; produces reports of potential trouble on demand.

In another conservation effort, an IBM computer has been controlling the interior environment at the One IBM Plaza Chicago office building for over a year. The computer turns lights and building equipment on and off, and adjusts system temperatures and operating modes to minimize energy consumption. Another feature is a heat recovery device known as a heat pump, which draws off heat from computer rooms and interior spaces and distributes it to the perimeter of the building where heat is required.

The overall conservation effort at Chicago has resulted in savings of 35 percent, of which 12 to 15 percent are attributable to computer control.

"Those are just a few examples of what's being done," says John Honeycomb. "They're important, all right. But the most important thing of all is the response of individual IBMers. There doesn't seem to be anybody who isn't trying to cut energy use." ■

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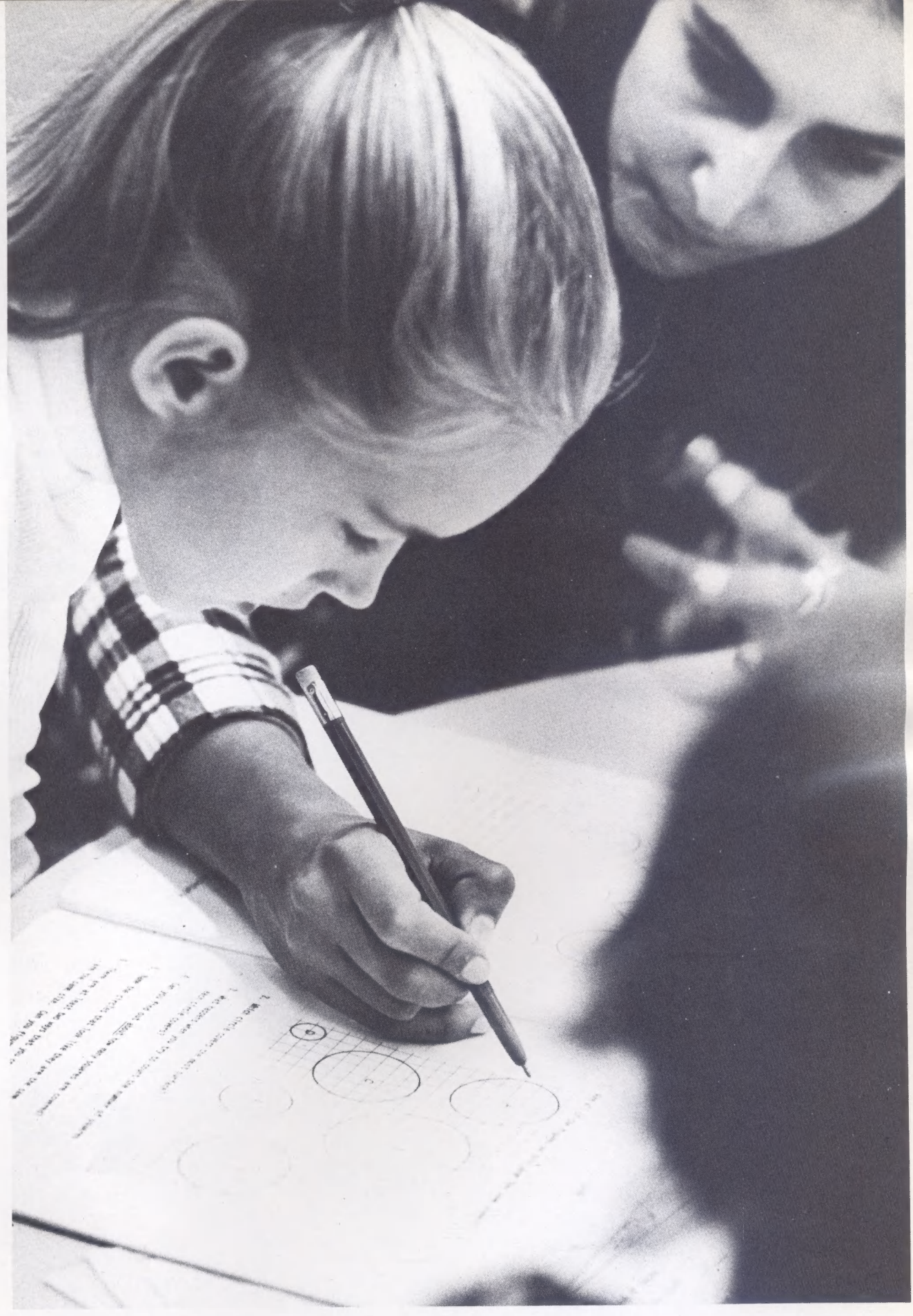

Nearly 700 teachers in 35 states and four Canadian provinces took part in field tests of Science Research Associates, Inc.'s Mathematics Learning System before it was released in January. Commented one impressed pupil: "Even our teacher says she's learning something." *(See page 40.)*

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